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THROUGH THE UNEXPLORED MOUNTAINS OF THE ASSAM-BURMA BORDER

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THE mountain tracts on the borders of Assam and Burma remain as one of the few unsurveyed areas of India. Here a country of densely wooded hills extends from the Brahmaputra to the Chindwin, reaching in the peaks of the Patkoi range heights of more than 12,000 feet. The north-west of this area is inhabited by the Naga tribes and consequently known as the Naga Hills. Other Naga tribes live also on the Burma side of the Patkoi but little is known of them.

Politically the Naga Hills are divided into three parts: the Naga Hills District, which is fully and directly administered; the Control Area, over which the Deputy Commissioner of the Naga Hills exerts his political influence in cases of village feuds; and the unadministered territory, which is in part even geographically unknown.

While I carried out anthropological field-work among the Konyak Nagas, a tribe under British administration, the Government of Assam kindly granted me permission to join an expedition into the unmapped country on the north-western slopes of the Patkoi range. The expedition was led by Mr. J. P. Mills, then Deputy Commissioner of the Naga Hills. We passed through villages never before visited by Europeans and throughout the expedition we were in touch with tribes which had, until then, almost entirely escaped the curiosity of anthropologists.

The long seclusion of the Naga Hills has been due to two reasons. The inhospitability of the country offers nothing to the peoples inhabiting the fertile plains of the Assam valley and has therefore never tempted them to expand in that direction; and the warlike character of the Naga tribes allowed no stranger to penetrate their land. Head-hunting and frequent wars made intercourse between villages extremely difficult and cut off the people on the hills in the interior from all contact with the outside world, for travelling alone or even in small groups in the unadministered parts of the

country is, for Nagas as for Europeans, a venture little short of suicide. "Cheap" heads of defenceless wanderers are only too welcome in every Naga village.

Thus the Naga tribes have lived for thousands of years undisturbed by the influence of higher civilizations. Neither Hinduism nor Buddhism ever found its way into these hills, where ancient and primitive cultural types have survived until to-day. It is for this reason that the Naga tribes are of supreme interest to the anthropologist. Forms of social organization, economic systems, customs and religious beliefs, long ago perished in other parts of Asia, are still alive and in full practice among them; and their material culture, though by no means poor, is of a remarkably primitive character.

Naturally the seclusion of the Naga tribes has not been as complete as that of an island people. Foreign goods, such as cowrie-shells, and metal implements must have been bartered from village to village for hundreds of years, but their influence on Naga culture as a whole has not been considerable. It would be wrong however to suppose that Naga culture is homogeneous or that migrations have never taken place in these hills.

The Naga tribes can clearly be divided into several main groups. One of them consists of the Angamis, Rengmas, Lhotas, and Semas, who according to their own tradition all come from the south, entering the Naga Hills through the gap of Mao. It is fortunate for anthropology that two eminent scientists, Prof. J. H. Hutton and Mr. J. P. Mills, worked among these tribes as District Officers and consequently described them in four separate monographs.

While the Ao Nagas, adjoining the Lhotas to the north, also form the subject of a book by J. P. Mills, information on the tribes to the east and north-east has, until recently, been completely lacking, for the Konyaks, the neighbours of the Aos to the north, though partly administered since 1911, are too far away from the centres of administration to be studied by officials; and the Changs, Sangtams, and Yimsungr, who border on the Aos and Semas in the east, have been visited only occasionally by punitive expeditions and survey parties. Complete mystery has however veiled the Kalyo Kengyus, of whom little more was known than their existence and the fact that they live in houses with slate roofs. I decided therefore when I went to the Naga Hills in June 1936, to work among the Konyaks and to grasp every opportunity of penetrating into the unknown area east of the administered territory.

The Konyaks, like all Nagas, build their villages on the top of ridges or spurs, generally in heights between 2500 and 5000 feet. From these villages one overlooks a wide mountain country, where dense forest alternates with cultivated land and large patches of young secondary jungle. This patchwork is resultant from the Konyak's system of shifting his fields every two years and then allowing the land to revert to jungle.

The hot valleys, cutting deeply into the mountains, are clothed in tropical forest, untouched by fire or axe. They are uninhabited and it is there that one finds tiger, sambur, barking deer, large herds of elephants, and multitudes of monkeys and birds. The Konyak avoids the valleys whenever possible. It is only for hunting and fishing that he climbs down, and all his fields lie on the higher mountain slopes.

The cultivation of water-rice on irrigated terraces, so typical of the Angami

Nagas, is unknown to the Konyak. His method of rice cultivation is less elaborate. Every year a suitable piece of land, uncultivated for about ten to fourteen years and therefore covered by dense jungle, is chosen, and the jungle cut down and burnt. A few trees are however left standing so that the jungle may quickly regenerate when the period of cultivation is over. Owing to the complete lack of manuring the soil is exhausted after it has been cultivated for two seasons, and many years of fallen and rotten leaves are necessary to restore its strength. Hence a community must own at least ten times more land than it can cultivate every year. Should a village be short of land, the rotation in which the fields are cultivated has to be quickened, and bad crops and famines are consequent. Ultimately over-cultivation results in a decrease of the jungle and the drying up of the land. As some Konyak villages have more than a thousand inhabitants, the pressure on the land is very noticeable, and there is no doubt that the country could not, under the present economic system, support a larger population.

While rice is the staple crop of most of the other Naga tribes, it is not so in all Konyak villages. There taro is as important a part of the diet as rice, and some Konyak villages grow no rice but live exclusively on taro and a small amount of millet. The choice of these crops is by no means climatically or geographically determined, but clearly represents a cultural preference. I am inclined to believe that taro was the main crop of an older population, which to a large extent still survives among the Konyaks, but hardly among the other Naga tribes, where later immigrants seem to be much more predominant. In a part of the world where all people, regardless of race and civilization, live mainly on rice, it is surprising to find a tribe cultivating taro, a crop as rare in India as it is common in the South Sea Islands. No doubt this fact supports the theory that the Konyaks represent one of the most ancient civilizations of south-eastern Asia.

The cultivation of taro is only one of the points on which the Konyaks differ from the south-western group of the Naga tribes. There are other elements peculiar to them: the men's elaborate face-tattoo and their habit of letting the hair grow, the blackening of their teeth, the wearing of tight belts of cane and bark as their only piece of dress, as well as the very scanty dress of the women. The enormous bachelors' halls of the Konyaks are unrivalled by those of any other Naga tribe, and the naturalistic carvings adorning them have little in common with the conventionalized art of the Angamis, Lhotas, and Semas. And the sacred autocratic Konyak chiefs, belonging to one endogamous clan, are without parallel in the Naga Hills.

After I had worked for four months in the Konyak country, the long-hoped-for chance of a tour into the unadministered area was offered to me by Mr. Mills, who was then preparing an expedition to the east beyond his district and very kindly invited me to accompany him. The tribes of the so-called Control Area, which borders on the Naga Hills District, are generally left to manage their own affairs undisturbed, the Deputy Commissioner merely arbitrating in quarrels when asked by the parties. In a country where defence has so greatly outstripped attack that a village is rarely entered except by treachery, the petty raids lead to little loss of life and call for no

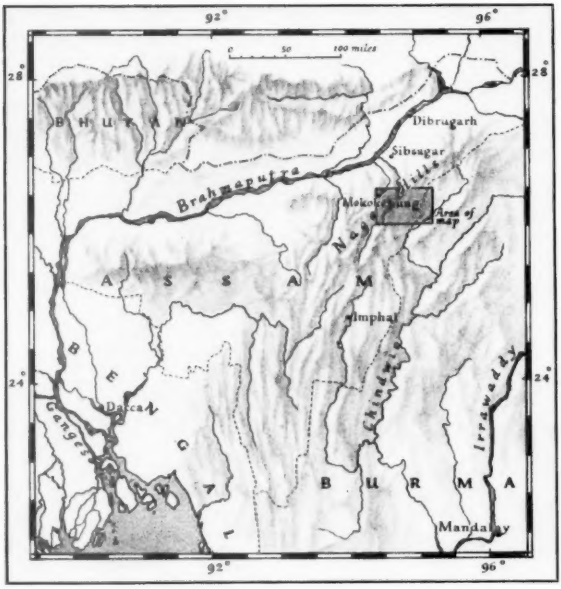
action. But in the summer of 1936 such grave news had come from the most eastern part of the Control Area that active intervention was unavoidable. Two small villages, Saochu of the southern Konyaks and Kejok, a small Chang settlement, both about six days' march from British territory, had been treacherously and completely wiped out by Kalyo Kengyu Nagas from the western slopes of the Patkoi. The raiders had taken one hundred and fifty heads and carried off several of the inhabitants, mainly children.

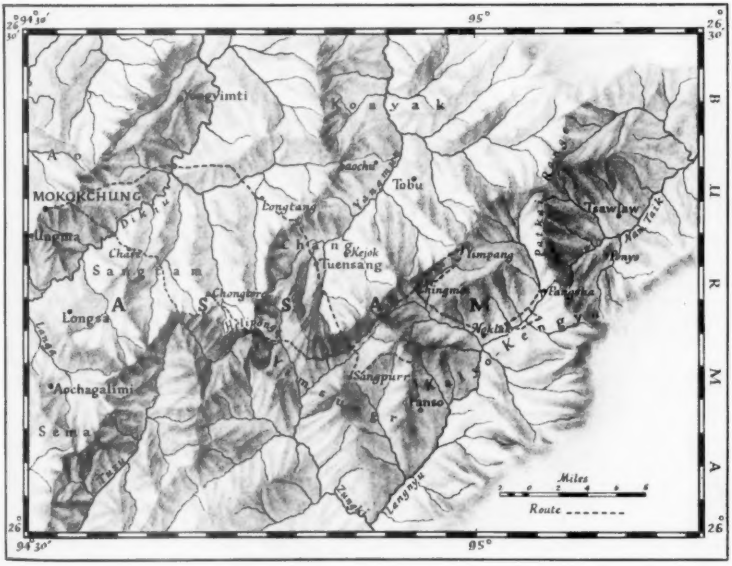
To stop the continual raids of the Kalyo Kengyus into the Control Area, and, if possible, to liberate the recently captured prisoners, was the official aim of Mr. Mills' expedition. As the chance of convincing the raiders, by mere persuasion, of the wickedness of attacking peaceful neighbours was very remote, a strong escort had to accompany us. Two and a half platoons of the Assam Rifles under the command of Major Williams gave to the expedition the necessary weight and security. To carry rations and kit there accompanied us 360 coolies under G. W. J. Smith, Subdivisional Officer at Mokokchung. The coolies were all Nagas from administered territory who, after years of enforced peace, readily volunteered for so exciting an adventure. They carried spears, shields and *daos*, the indispensable axe, weapon and universal instrument of the Naga.

Travelling in the Naga Hills during the rains, which last from April to the end of September, is most unpleasant and can become extremely difficult when one leaves administered territory, for the rainfall of 30 inches a month swells the mountain streams and by removing the frail bamboo bridges hostile tribes can easily prevent an entrance into their country. Thus it was considered unadvisable that the expedition should start until the beginning of the dry season and it was early in November before we left Mokokchung, one of the administrative centres of the Naga Hills. The first night we camped at Chare, a Sangtam village recently taken under administration. The next day we crossed the Chimei river, which forms the frontier of British India. The country of the northern Sangtams, through which we moved for several days, was perfectly peaceful. Even here, so near to administered territory, we came upon villages, Holongba for instance, never previously visited.

Compared with most other Naga villages, those of the Sangtams make a poor and rather miserable impression. Some of them outwardly resemble Ao villages, while others show a type of house with high protruding gables. The material culture of the Sangtams seems to contain little which is peculiar to them. One of the few interesting features are the wooden Y-posts, which are erected in the course of mithan sacrifices. We were struck by the general lethargy of the inhabitants and the high percentage of imbeciles, while in some villages almost every second person suffered from goitre.

Chongtore was the last Sangtam village at which we camped. From there our way led up to Mount Helipong, 7280 feet above sea-level, one of the landmarks of that part of the country. Its higher slopes are covered with virgin forest, quite different in character from the woods in the lower regions. Wild bananas and ordinary bamboos do not grow in these heights, but only a certain thin thorny bamboo which stands the cold. Enormous trees, stretching their gnarled branches against the sky, and an impenetrable undergrowth show that these slopes have never been cultivated. Yet on the top of the





The Naga Hills

The Konyak Naga village of Wanching

Bachelors' hall (morung) of the Konyak Nagas

mountain, open to all storms, the houses of a small village cling to bare rocks. The inhabitants belong to the powerful tribe of the Chang Nagas and the village was built as an outpost against the Sangtams. No other reason could have induced people to live in such a cold, inhospitable spot. Strangely enough they have not adapted their dress to the climate in which they live and while we shivered in our warm clothes, the villagers walked about, apparently quite comfortable in the icy wind, with little more than loin cloths round their hips. Their fields, on which only millet and the hardy Job's tears can be grown, are on the lower slopes deep down below the forest, and all the grain has to be carried up on their backs.

Though rendered more or less safe from raids by their splendid strategical position, the men of Helipong are too weak to attack. They are glad therefore if their more powerful tribesmen of lower and more fertile ridges occasionally send them a share of their spoils of war. Chentang, another Chang village, had recently killed an enemy while repulsing an attack of the Yimsungr village of Sangpurr. Cutting off one hand, they sent it to Helipong as a complimentary gift, where we found it hanging from a tall bamboo pole.

The view from Mount Helipong, over an immense mountain country, was magnificent. We overlooked the land of the Lhotas and Aos as far as the distant hills of the Konyaks. The country of the Changs and Sangtams lay at our feet and in the east we saw the mountains, the slopes of which we later found to be inhabited by Kalyo Kengyus. From here the Patkoi range with Mount Saramati (12,622 feet) was clearly visible. Helipong is on the watershed between the Brahmaputra and the Chindwin. The rivers to the east belong to the basin of the Irrawaddy; following them one would, should one not lose one's head *en route*, come to Burma. During the following days we continued to march eastward, at almost right angles to the numerous mountain ranges running parallel with the Patkoi range. Since all Naga villages are built on top of ridges or spurs, and since it is more convenient to camp near a village, our daily routine consisted in dropping into the deep valley and climbing up again several thousand feet on the other side.

After several days' march we at last approached the scene of those events which had led to our expedition. We built a base camp at the village Chingmei on the border of the Chang country and the Kalyo Kengyus, fortifying it with a strong palisade of sharp pointed stakes and bamboos. The intelligent and energetic chief, Chingmak, welcomed us enthusiastically and was in the future of the greatest help. He acted as intermediary when Mr. Mills negotiated with the neighbouring villages, and when we finally marched against Pangsha his men acted as our scouts and guides.

The Chang warriors of Chingmei are the finest looking Nagas I have seen; none are of better physique or are more picturesque. High hornbill feathers quiver on their red, conical cane head-dress, which is covered with bear's skin and large boar's tusks. A blue cotton cloth embroidered with cowrie shells is wound round their body and their broad belts are decorated with small white seed beads. In a wooden sheath on their back, forming part of the belt, they wear the long sword-like dao. A small apron, often also decorated with cowries, hangs down from the belt. Apart from the dao the warriors

carry long spears, the shafts of which are tufted with red goat's hair; a heavy shield of buffalo hide completes the war-dress. The dress of the women is much simpler and consists only of a dark blue skirt and a cloth, sometimes embroidered with red dog's hair. White shells are the most common ornaments.

Chingmei is a large village, heavily fortified and built in typical Chang style. The steeply sloping house-roofs rise from just above the ground at the back to about 30 feet in front, and protrude so much that it is often necessary for posts to support the long gables. In narrow streets the roofs of opposite houses very often dovetail and the space before the houses is completely overshadowed. Particularly high are the roofs of the men's houses containing the huge log-drums. Large collections of skulls which hung on strings at the main posts of these men's houses showed that Chingmei has not always been as peaceful as it seemed during our visit. Mithan and buffalo horns were attached to many of the skulls; the underlying idea of this custom is not quite clear, though it is a frequent combination in the Naga Hills. A possible explanation might be found in the character of buffalo horns as fertility symbols; as such they seem appropriate ornaments of head-hunting trophies, which are believed to promote in a magical way the fertility of the crops. In one men's house we were shown with pride the skull of a Kalyo Kengyu of Panso village, who had personally taken fifty heads.

In the centre of the village we saw a strange funeral monument: a huge crescent of plaited bamboo, representing a rainbow, was erected on poles. Along the monument stood wooden posts, some of them Y-posts, as tallies of the mithan and buffalo sacrifices the deceased had performed.

We heard from the Chingmei people that Pangsha, a powerful Kalyo Kengyu village, the exact position of which they did not know, was responsible for the burning of Saochu and Kejok and the massacre of their inhabitants. As news travels fast in the Naga Hills the men of Pangsha were well aware of our coming. Through neutral villages they sent us challenges to come and fight them, saying that they would on no account consider giving up any of their prisoners: they called us a crowd of women against whom they would not bother even to use their spears and daos, their wives' wooden pestles being good enough to beat us off with. But in spite of their boasting messages they apparently became uneasy when they heard that we really intended to attack them. They sent us therefore through intermediaries three of the captives whom they had taken at Saochu and Kejok: one young woman and two children. I have never seen three more miserable creatures. Since their capture they had been dragged from one hostile village to the other, aware all the time of the terrible fate awaiting them. The stories of prisoners of war, who are beheaded at the great Feasts of Merit or sacrificed at the building of a new bachelors' hall, are only too well known in those hills.

As, according to our information, there remained at least one other girl still in the hands of the Pangsha men, their attempts to buy us off did not deter Mr. Mills from his plan. He was determined to march against Pangsha and liberate the remaining captives. However we had first to deal with one of Pangsha's allies, Yimpang, a village on a ridge in sight of our camp. The men of this village still held a captured boy from Saochu. With the help of

Naga carriers crossing a river

Konyak Naga bridge of suspended cane

Chingmak, chief of the Chang village of Chingmei

Chang girl from Tuensang

the chief of Chingmei we succeeded in impressing on Yimpang the necessity of giving up their prisoner and letting us enter their village in peace.

Yimpang lies 6860 feet above sea-level and is inhabited by a mixed population of Kalyo Kengyus, Changs and Yimsungr. Yet the style of the houses is the same as in the villages of unmixed Chang population. The Yimpang people differ from the Changs however in their manner of treating captured heads, and follow the custom which we were to meet again in the pure Kalyo Kengyu village of Panso. The head-tree, an *Erythrina*, stood in the centre of the village. Long bamboo poles had been leant against this tree and from their tops hung numerous heads. Large wooden horns and a small carved board, representing a hornbill feather, had been attached to some of the heads. Bamboo spikes had been stuck in the eye sockets; thus the victors intended to blind, in a magical way, the souls of their victims so that they should be unable to take their revenge. The hair of the Saochu men, who wear it long in Konyak fashion, had been removed, together with the scalps, for human hair is valuable and is used for many ornaments. Though our reception in Yimpang was anything but friendly, the visit passed without incident.

Two days later we marched off towards Pangsha, the main objective of the expedition. We left the majority of our coolies and all dispensable luggage at the base camp at Chingmei. As guide we were fortunate to secure a certain Yimpang man, who nursed a personal grievance against Pangsha. Neither Chingmak nor any other Chingmei man had ever before risked his life by such an excursion, which illustrates how Nagas often live a life-time in their own villages without ever seeing parts of the country in their immediate neighbourhood. Our maps, which until then had served as rough guide, were of no more use in the area east of Chingmei, for no survey party had ever penetrated into that country. We knew however from the Chingmei men that another large Kalyo Kengyu village, Noklak, lay on the path to Pangsha. As Noklak had been at war with Chingmei for some time, the path which runs along a steep hill-side was completely overgrown. With infinite trouble we had to cut our way through the jungle, and we had soon ample proof that we no longer moved in friendly country, for the path was thickly set with *panjis*, sharp bamboo spikes which Nagas stick into the ground for the benefit of the feet and legs of the unwary enemy. These panjis are almost invisible in the grass and before long three of our men had fallen victims. A Chingmei man, accompanying us as a scout, had his foot pierced right through, but taking little notice of the wound he happily continued.

A great crowd of warriors in full dress awaited us near the village of Noklak. After long shouting to and fro we arrived at a peaceful understanding and were told that Noklak dared not offend Pangsha by giving us easy passage and had therefore blocked our way with panjis. Noklak was the first Kalyo Kengyu village we had seen, and the great difference between it and the Chang villages struck me immediately. Never before have I seen a clearer ethnographic boundary than here between Kalyo Kengyus and Changs. Environment, climate, supplies of materials are much the same in Chingmei and Noklak, and yet the two villages, only a few miles apart, are as different as Naga villages can be. Noklak justifies the name of the Kalyo Kengyus, meaning "stonehouse dwellers." The small low houses are roofed with

slates, but a thin layer of palm leaves lies on top of the slates. The roofs are flatter than those in any other Naga village.

It is understandable that these slate roofs were considered strange and curious by all the neighbouring tribes, for the use of stone for slating houses is restricted to the Kalyo Kengyus and a few villages of the southern Sangtams. It is not recorded from any other hill people in Assam or Burma. No wonder the slate roofs of the mysterious Kalyo Kengyus should spread the fame of a tribe of whom little else was known, and it is this fact which has raised the interest of anthropologists in this remarkable people. The expectation that the Kalyo Kengyus would differ in more than this one way from the better-known Nagas was fulfilled by all we saw in Noklak and in other of their villages. One of the most outstanding features of Kalyo Kengyu culture is the enormous xylophones, made of hollowed trees. Inside such a log-drum, which has no slit along the top but is open at both ends, a man can sit with comfort. No other Naga tribe makes xylophones of exactly the same type, but I have seen a log-drum open at both ends in the Yimsungr village of Sangpurr. The chest tattoo of the Kalyo Kengyu men of Noklak is richer than that of the Changs and consists of curved lines, small circles, and conventionalized figures.

The defences of the village are excellent: sentry-boxes high up in the trees, accessible by bamboo ladders from within the wall, overlook the country around. One enters by a narrow, roofed gangway, leading through a living wall of impenetrable creepers and prickly shrubs. Only towards Pangsha, with which Noklak lives at peace, defences were almost lacking.

From Noklak we looked down into the valley of the Langnyu river, which flows southward through unknown country, evidently joining the Zungki and Tizu later, and finally, as the river Tiho, flowing into the Chindwin. After camping a night at Noklak, we proceeded cautiously on our way to Pangsha. Our path lay along the slopes on the western bank of the Langnyu, and across it to the east the hills swept magnificently up to the main range of the Patkoi, beyond which lay Burma. When ultimately the whole of the hills are surveyed the boundary between Assam and Burma will probably run along this range. Its highest peaks must be well over 10,000 feet, for according to our rough estimate we moved at a height of at least 6000 feet above sea-level.

At last, on one of the far slopes, Pangsha came in sight. It consists of two separate settlements some 3 miles apart. Peacefully it seemed to lie above golden fields; and no one, seeing the scattered houses, the roofs shining in the sunlight, would have believed that the inhabitants of this inoffensive village terrorized the whole country. We had been warned by the Yimpang man, Pangsha's former ally, of their plan to lead us into an ambush, by meeting us with a present and thereby putting us off our guard. True enough, for it was not long before we saw a small party approaching conspicuously leading a goat. But at the same time our field-glasses picked out masses of armed men crossing the river below us and disappearing into the jungle where our path would lead down into the valley. The envoys with the goat attempted to greet us as friends, but declared falsely that they could not produce the girl, whom we knew by this time to be in Pangsha's hands. Thereupon Mr. Mills sent them back and thus formally declared war. In order to avoid the ambush,

we cut our way straight down into the valley and camped by the river for the night. We expected to receive a few of Pangsha's famous poisoned cross-bow arrows in the camp, but there was no incident. A scratch from one of these arrows is fatal in a few minutes. Though the same poison is sometimes used by the Changs, we were unable to identify it. All we heard is that it is made of the juice of a certain tree, but it seems that however far one goes into the hills it is said to grow yet further on. Experiments undertaken with samples in a Calcutta laboratory proved that it is a still unknown and potent vegetable poison which paralyses the respiratory organs.

On approaching the main village of Pangsha the next morning we were surprised that there should be no resistance. The inhabitants had removed all their moveable property and were in hiding in the jungle.

While other Naga villages are heavily fortified, Pangsha had no defences. Its incomparable prestige rendered it immune from all aggression so that fortifications appeared superfluous. Therefore the houses stood, not crowded together as in other villages, but loosely scattered between kitchen gardens and banana trees. They are however low and rather miserable looking bamboo buildings. Only the bachelors' halls are better built, having strong carved posts and protruding roofs rising towards the front. The granaries stand apart and are built on low piles. Flat discs slipped over the piles, in the same manner as in the Konyak and Chang villages, prevent the rats from getting into the granaries. On the head tree, which overshadowed one of the large log-drums, hung thick bundles of human heads, some with skin and hair still well preserved.

In their hurried retreat the Pangsha people had been unable to evacuate all their domestic animals. Cattle, goats, pigs, and chickens ran about the deserted village. I was surprised to find here Indian cattle, which are otherwise only kept by those Nagas who live near the plains of Assam. I can only suppose that the Pangsha had bought them from Burma. They also keep mithan (*bos frontalis*) and buffaloes in a semi-wild state; some of the former we had seen the day before on the open slopes above the river. Like other Nagas the Kalyo Kengyus use mithan, buffaloes, and cattle solely as meat and as sacrificial animals. We heard that mithan sacrifices are performed in the course of Feasts of Merit, but in no Kalyo Kengyu village did I see the forked posts or monoliths which among other tribes are invariably erected at such ceremonies. As the inhabitants had fled taking with them the captive child there was nothing to be done but to burn the village. The flames sprang from roof to roof, and soon the invincible village was one blazing mass of fire. Clouds of smoke covered the sky and the light of the sun turned to an unreal and ghastly violet.

But the task of the expedition was not yet finished. The next day the coolies and half of our escort were sent ahead, back towards Chingmei; and with fifty rifles, we ourselves went up to burn the smaller settlement of Pangsha. Again we found the inhabitants had fled, and soon the village stood in flames. Here also many heads hung from a tree and among them the leg of a child, not more than three years old. I decided to take some of these heads back with me as anthropological specimens, but though we found a convenient basket in which to carry them none of the Nagas in our company volunteered

to carry the heads. Thus I had, to the amusement of the Nagas and the surprise of the sepoys, to take the basket on my own shoulders.

Our way down led through fields of giant millet, 10 feet high. We had only gone a few hundred yards, when we saw a stream of armed men coming from the main village. Though carrying spears and shields they ran with incredible speed and it was immediately clear to us that they meant to cut us off and, we feared, wipe us out. They outnumbered us ten to one, they knew the country, and had never known defeat. Our only chance was to seize some position where range would help us; for the giant millet was easy to charge through and yet effective cover from our rifles, and thus the enemy would be on us before we could have seen them properly. We hurried down the slope as fast as we could and just succeeded in getting between the attackers and the river. But the Pangsha men were close on our heels and with a hoarse roar from hundreds of throats, which none of us will ever forget, they came rushing behind us down the slope. Even then we were unable to see them and the war-cries rose to a frightening noise; just then our advance guard reached a knoll where they made a stand. Rifles cracked, and bullets whistled as they fired over our heads at the enemy close behind, but invisible to us. Fortunately five Pangsha men dropped to the ground, and this checked the attack at the very last minute. We were saved, for though they followed us roaring and shouting down to the river, the first determined attack was not repeated. Through all the fight I had carried the head trophies and I proudly brought them into camp when we rejoined the rest of the column some hours later.

Mr. Mills, familiar with Naga mentality for twenty years, was convinced that in spite of our rapid retreat, Pangsha would take the loss of five of their best warriors and the burning of the village as a shattering defeat. He sent word therefore through men of another village to Pangsha that he was ready to talk things over with them and would guarantee the security of any negotiators. To my great surprise a deputation came to our base camp at Chingmei two days later. It was an amazing scene. Men who had attacked us, with no intention of quarter, were soon talking quite amicably about the incidents of the fight and discussing terms for an understanding. They accepted Mr. Mills's terms and promised to give up the girl, whom they still held. Peace was solemnly sworn and a few days later the girl, a child of four years, was duly brought to our camp.

A few men from Ponyo, a village on the Burma side of the Patkoi, had come in the company of the Pangsha envoys. Curiosity to see the mysterious white men must have attracted them. Their language is said to be entirely different from the dialects of Pangsha and Noklak. They are richly tattooed on the breast, back, arms, and legs, and wear the hair long, tied up in a knot in the way of the Konyaks. They have apparently little in common with the Kalyo Kengyu and may belong to the southern group of the Konyaks. If that is so, it would be evident that, apart from some fifty thousand Konyaks on the Assam side of the Patkoi, there are also Konyak villages on the Burma side.

In the course of the remainder of our tour we visited the Kalyo Kengyu villages Yukao and Panso, which lie south of Noklak on the hills lining the Langnyu river. The country round is extremely poor in forest and jungle. Only single alders (*aldus nepalensis*), a few bamboo clumps, and some scattered

Funeral monument in Chingmei, consisting of a bamboo crescent and a row of forked posts

Main range of the Patkoi, on the slope of which lies Pangsha

Houses in the Chang village of Tuensang

bushes stand on wide open slopes. It is clear that the country has been cultivated to the point of exhaustion. Rice does not grow well in those heights, and its place as the staple diet is therefore taken by the more resistant Job's tears; early in December the reaping had not yet been finished. Millet and maize are also grown and even small quantities of rice on particularly favourable spots. The cultivation of maize, not introduced into India before the middle of the seventeenth century, shows that the seclusion even of these tribes has by no means been complete.

In Panso, where we were received with friendliness, I had at last an opportunity of collecting some information on the social life of the Kalyo Kengyus. The main settlement of Panso is divided into two *khels* or quarters, separated by a narrow corridor. Each of the two khels is fortified against the other by a strong palisade which runs along the corridor. Sentry-boxes in trees guard this inner line of fortification. It seems that civil war is not an uncommon occurrence, but in contrast to more civilized nations the men of Panso have wisely invented special weapons for these internal quarrels. They are in the habit of using for these fights, wooden swords instead of their iron daos, protecting their heads by huge plaited helmets lined with pieces of old cloth. So armed, even the fiercest rivals cannot seriously harm each other and superfluous energies find outlet without upsetting the community.

There is no hereditary chief in Panso, nor in any of the other Kalyo Kengyu villages which we came to know. They are all organized on democratic lines, men excelling in war or wealth acting as leaders. In Panso however there is a certain man who acts at magical and religious ceremonies, whose dignity is hereditary in his clan. He functions at all rites connected with head-hunting, and after the heads have hung long enough on bamboo poles they are brought to his house and kept there until his death; they are then thrown away and his successor must start anew his own collection. There are three exogamous clans in Panso. While polygamy is frequent among the Changs, the Kalyo Kengyus are strictly monogamous. They pay no bride-price and marriages are therefore not very stable; it is said that the women run away from their husbands on the slightest provocation. Like the Konyak and Ao Nagas, the Kalyo Kengyus of Panso and Noklok place their dead on platforms. This is the most southern example of platform burial known in the Naga Hills.

The people of Panso, having only recently lost ten heads to Pangsha, were so pleased with the burning of their enemies' village that they arranged a great dance in our honour. The ceremonial dress of the men is very like that of the Changs. The cane hats are decorated with goat's hair dyed red, hornbill feathers, boar's tusks, and mithan horns; and a cheek strap set with tiger's claws holds the hat in place. Strong cane rings protect the right upper arm against dao blows and leggings of bear's skin the legs against panjis. The long daos are carried in a wooden sheath on the back.

On our return journey we passed through the Yimsungr village of Sangpurr. There I saw several wooden forked posts which are erected on the occasion of mithan sacrifices. Similar sacrificial posts in Y-form are set up by Semas, Aos, Sangtams, and Changs, but strangely enough they are absent in the Kalyo Kengyu villages though Feasts of Merit are also held there. The

Yimsungr outwardly resemble the Changs, but nothing is known of their social organization. Among them as well as among the Kalyo Kengyus much work is still to be done.

We returned to administered territory by way of Tuensang and Longtang, a route north of that by which we had come. The Chang and Sangtam villages through which we passed, though by no means well known, have been visited before and they have been partly described by Prof. J. H. Hutton in his "Diaries of two tours in the unadministered area east of the Naga Hills" (*Memoirs of the Asiatic Society of Bengal*, vol. XI, 1929).

After returning to Mokokchung, the starting place of the expedition, I parted from Mr. Mills and went back alone to the Konyak country. The news of Pangsha's defeat had already spread over the hills and soon it became known that I was bringing with me human heads. My Konyak friends, who to their great distress are no longer permitted to go on head-hunting raids, jumped at once at the opportunity of procuring some heads, for the manner in which they are acquired is irrelevant. In any case the ceremonies may be performed, and the magical power attached to the head benefits the whole of the community and increases the fertility of the crops. As I approached the Konyak land therefore the Konyaks of Wakching, with whom I had lived for four months, and those of several neighbouring villages came to meet me; they besought me to hand over the heads from Pangsha. Since I had looted them from the same hostile village, some inhabitants of which were subsequently killed in open fight, they could be considered perfectly good head-hunting trophies.

Since in handing over the heads I gained the opportunity of taking part in head-hunting ceremonies that no white man had ever watched, I did not hesitate to fulfil the wishes of the Konyak men. The heads were cut up and the pieces distributed among all administered villages; my personal friends from Wakching received extra privileged shares and it was then that I learned how differently the various parts of head are valued. The jaws and the parts round the eyes are the most prized; the back of the head is considered much less precious.

When the Wakching men arrived at their village they placed the pieces of the enemies' heads at the threshold of the gate and the oldest man of each of the clans that had received a share of the heads performed an important ceremony. He first took a raw egg and smashed it against the head; then he poured rice-beer over the head saying in a low voice: "May your mother come, may your father come; may your brothers come; may all come to drink our rice-beer, to eat our rice, to eat our meat, may they come!" The smashing of the egg is intended to blind—by sympathetic magic—the victim's relatives. It is a custom never omitted in ceremonies of this kind and the people of villages never buy or accept, even as presents, eggs from a village they have once been at war with, for they say that they could not accept from their former enemies eggs so like those thrown into the eyes of their own relatives whose heads had been taken. The feeding of the skull, another widespread custom, is intended to compel the soul of the victim to call all his relations so that they too may be killed and their heads brought to the

Kalyo Kengyu village of Noklak, with slated hou

Bachelors' hall in the Kalyo Kengyu village of Pangsha

Log-drum in Pangsha

village. This rite was performed independently by the clan elders, representing each men's house. For in the case of a head actually being captured, the raid has usually been undertaken by men from only one or two *morungs* (men's houses) and members of these morungs only take part in the subsequent ceremonies. But I had distributed parts of the heads to all the morungs and so the whole village celebrated the event.

Every morung formed a procession, headed by the oldest warrior carrying the trophy, and the processions solemnly marched through the village. First they moved to the house of the chief. The chief himself does not take any particular part in these ceremonies, but the men danced in front of his house for a while and then each group rushed off to their own club-house. Here the girls, in accordance with an old custom, brought them water with which the warriors "washed off the blood of their enemies." The basket containing the head was then fastened to the end of the enormous log-drum and the young men started immediately to beat on it in the peculiar rhythm which announces the capture of a head to all the villages in the neighbourhood.

Later in the evening the head was removed and hung up on the large central post of the men's house. It was then the turn of the girls and young women to beat the drum, while the men and boys danced inside the morung. The old people sat chatting and drinking in the open porch; even the women being admitted that night. There were tears in many eyes as they watched the roaring and dancing crowds that revived the happy memories of their own youth.

The next morning found the whole village busy with preparations for the great head-taking dance. It was many years since Wakching had celebrated such an event and the young men proudly put on the ornaments of warriors for the first time. They sat about on the open bamboo platforms of their houses arranging the hornbill feathers for their hats and brushing the tassels of human hair which hang down from their head-dress. They painted each other's backs and their own faces with chalk and drew designs on their bark belts with indigo. For the first time they were entitled to put on the boar's tusks worn as neck-ornaments, ivory arm rings, and cane rings worn below the knees. Later in the day the men of each of the five morungs killed a pig and prepared the meat for the feast, which was to be held that night.

Once more a procession was formed outside each of the morungs and the younger men proceeded to the chief's house carrying fully leaved bamboos; they were followed by the old men carrying the head and models of heads made of cane with mithan horns attached. In front of the chief's house stands a small monolith, before which lies a flat stone. There a man, who is a descendant of the village founder and who acts on such occasions, is supposed to cut off the tongue and the ears of the head and bury them under the flat stone. There were no tongues and ears left on the heads I had given to the Wakching, but the rite was carried out with the existing requisites as well as it was possible. The descendant of the village founder killed a chicken and repeated the spell by which the relatives of the victim are supposed to be compelled to share his fate. This ceremony performed, the rest of the day was spent in dancing and singing.

Finally the men of each morung placed their piece of head in a carrying

basket and hung it up on a ficus tree close to their morung. In the case of a fresh head it hangs there until the flesh has rotted away.

The next weeks were filled with the preparations for the final ceremonies and feasts. Many of the ornaments to which the young Wakching men were now entitled had to be made or bought from other villages. An important part of a head-hunter's outfit is, for instance, the ceremonial spear, tufted with black and red goat's hair. These spears are not manufactured at Wakching, but only in some neighbouring villages to the east, such as Chi and Totok. The Wakching men had therefore to set out on trading expeditions in order to provide the necessary ornaments as well as the pigs for the coming feasts, and for these they bartered daos, brass rings, and other goods made in Wakching. In the meanwhile the women were busy in preparing the enormous quantities of rice-beer, which were required during the feast days.

On the fifth day of the new moon the final feasts began. For three days no one went to the fields and only that housework that was most necessary was done. Those who could afford it killed a pig and shared the pork with their less fortunate relatives and friends. The heads were then taken down from the trees near each morung where they had been hung up, and mithan horns were attached to them. The descendant of the village founder repeated the ceremony which had already been performed when the heads were brought in. Once again he fed them with rice and rice-beer, bidding them to call all their clansmen in order that they might be slain. It was after this that the dancing began. The men and boys in full ceremonial dress wore all the ornaments which they had bought and made in the last weeks. The oldest men carried the heads, in baskets decorated with tassels of palm leaves; they danced outside the circle of the other dancers, swinging the heads and singing in shrill voices of the glorious deeds of their morungs.

The feast lasted three days. Only then did the village life return to normal; but to a normal that nevertheless differed from the time before the heads were brought in. The young men continued of course to wear some of the ornaments to which the recent ceremonies had entitled them. There was dancing on every possible occasion and even the work in the fields was accompanied by songs. In other years the gangs of boys and young men must work silently, but after a head has been taken their songs may be heard from every slope. They danced and shouted on their way to the fields, where they cut and burnt the jungle, and even during the tedious work of weeding the rice-fields.

All the people of Wakching were convinced that this year, in which the heads have been brought in, would have a particularly good harvest, and when I left Wakching in June the promise of the crops seemed really better than they had been for many years. It is obvious that the bringing in of the head does not only provide an opportunity for feasting, a pleasant interruption in the monotonous life of a Naga village, but it exerts also a stimulating influence on the economics of the people.

The main result of my tour into the unadministered territory with J. P. Mills is the material which I was able to collect on the Kalyo Kengyu Nagas. Though necessarily incomplete and superficial, it allows for some comparison

Native of Ponyo, a Naga village on the Burma side of the Patkoi range

Kalyo Kengyu Nagas of Pangsha meeting the column as negotiators

Kalyo Kengyu Nagas from Panso in ceremonial dress

Konyak Nagas during the headhunting dances, carrying pieces of the heads in a ball of cane adorned with mithan horns and tassels of palm leaves

with other tribes and fills a gap in our knowledge of Naga culture. We now know that the Kalyo Kengyus, in spite of numerous interesting cultural peculiarities, do not differ completely from the other eastern Naga tribes. It has become evident that there are two main cultural strata in the Naga Hills. The stratum undoubtedly the youngest is represented by the Angamis, the tribe bordering on Manipur. Rice cultivation on irrigated terraces is peculiar only to them, to the eastern Rengmas, and to some of the Nagas of Manipur. All other Nagas grow dry rice, knowing of no artificial irrigation; neither are rice terraces found among any other hill tribe of Assam. Moreover the Angamis have a highly developed megalithic culture; at their Feasts of Merit, menhirs are erected and stone circles built, while graves are often constructed in the form of stone platforms.

The erection of monoliths as memorials for Feasts of Merit is less frequent among the Lhotas, and unknown among the Sema, Aos, and Konyaks as well as among the Sangtams, Changs, Yimsungr, and Kalyo Kengyus. Among the Aos, Semas, Sangtams, Changs, and Yimsungr the stone memorials are replaced by wooden forked posts of Y-shape; in much the same way such Y-posts are used as substitutes for menhirs in the megalithic cultures of Africa, Indonesia, and Oceania. Yet it seems that only a last and rather weak wave of megalithic culture touched these eastern Naga tribes. The Konyaks erect stones during their head-hunting ceremonies, but not in connection with Feasts of Merit.

Common to all northern and eastern tribes is the shifting cultivation, a method of agriculture by which jungle is felled and burnt and the crop sown on ground only slightly dug over. While the staple crop of the Aos and Semas is rice, the Konyaks plant also a good deal of taro and the Changs, Yimsungr, and Kalyo Kengyus live mainly on Job's tears. It has been already mentioned that the cultivation of taro must be a cultural preference of the Konyaks, for their country is very suitable for rice. The prevalence of Job's tears among the latter tribes however is due to climatic reasons: the ranges on which they live are so high that rice does not grow well.

An element peculiar to the Konyaks, Aos, Sangtams, Changs, Yimsungr, and the Kalyo Kengyus is the enormous log-drums, which, not found among any other people of India or Burma, have their nearest parallels in Oceania. We are safe in saying that they belong to the oldest stratum of Naga culture. Apparently equally old are the men's houses (*morungs*) which remind us in their function and style of the men's house of New Guinea. They are absent in Angami and Sema villages and reach their most imposing form among the Konyaks.

Still a mystery is the origin of the slate roofs of the Kalyo Kengyus and of some of the southern Sangtams. We do not find slated houses anywhere else on the main land of south-eastern Asia, but some of the hill tribes of Formosa also cover their houses with slates. This parallel is all the more interesting as the head-hunting ceremonies of these tribes resemble, even in detail, those of the Nagas.

There is another element which appears to be very old in the Naga Hills: the custom of tattooing the face and body. It is practised among the Konyaks, Kalyo Kengyus, Changs, and Aos, but not by the Angamis, Lhotas, and

Semas. The most elaborate tattoo I have ever seen was that of the men of Ponyo, the neighbour-village of Pangsha.

These few examples may show that the oldest cultural types still surviving in the Naga Hills are found just among the less-known tribes to the east and north. There a great field lies open to the anthropologist. The work that has been done is very limited compared with the vast possibilities for research. In Africa and Oceania anthropologists work among peoples whose own culture is already partly destroyed and disintegrated by western influences, but in studying the Nagas of Assam no laborious reconstructions of old customs and beliefs are necessary. Most of them still live practically the same life as their ancestors, while many thousands of the northern and eastern Nagas have never seen a white man.

Thus we have the chance of studying the social and economic life of primitive tribes whose ancient culture is still flourishing. It is fortunate that a wise administration makes every effort to preserve native culture, thus sparing to the Nagas the sad fate that has befallen many other primitive races. Those who have been to the Naga Hills will agree that it is difficult to imagine a form of administration better suited to primitive peoples, and I am personally greatly indebted to the interest of the British authorities in native culture and anthropological research. My thanks are due particularly to Mr. J. P. Mills, whose continual assistance enabled me to work for thirteen months in a district otherwise closed to all travellers.

DISCUSSION

Before the paper the PRESIDENT (Professor HENRY BALFOUR) said: The lecturer to-night is Dr. von Fürer-Haimendorf, a distinguished Austrian anthropologist who has recently spent a year making an intensive study of one of the most interesting tribes in the Naga Hills. During the course of his time there he was able to go with Mr. J. P. Mills on one of the unfortunately necessary punitive expeditions into a portion of the Hills never visited before by Europeans, and this portion of his tour was thus actually off the map. Dr. von Fürer-Haimendorf has much of very great interest to tell us, and, in introducing him to you and asking him to deliver his lecture, I would like to extend to him a very cordial welcome.

Dr. von Fürer-Haimendorf then read the paper printed above, and a discussion followed.

The PRESIDENT: We have with us to-night one who is the greatest authority on the Naga Hills in general. I am sure you would like to hear some remarks from Professor Hutton.

Prof. J. H. HUTTON: I have been watching a lot of old friends and many familiar scenes, and it has made me quite homesick. I feel rather unhappy too—"maya lagicche" is the expression in the Naga Hills—because not only have I seen places I have been to often and ones I have visited occasionally, but Dr. von Fürer-Haimendorf has been to the promised land that I was only able to look at from the Pisgah of Chingmei.

He mentioned the question of maize and millet. I rather think that millet is the oldest grain cultivated in that area. It has a distribution across to Formosa, and I believe it is grown all over the East. Maize probably dates within the last one hundred years in those hills; it was no doubt brought in by the British,

though it may have gone in earlier. In any case, I do not think we can allow much more than one hundred years to maize. Millet, of course, goes back for thousands of years. Rice came in as wet cultivation and is now cultivated dry. I think it probably came in with the terrace cultivation to which the lecturer referred.

He mentioned the poisoned arrows. I had some tested in Calcutta, and though they could not be certain the poison used was aconite, they reported that there was nothing to show it was not, and we know that aconite grows in those 8000-foot Naga Hills.

Dr. von Fürer-Haimendorf referred to platform burial, and we get curious cases of it farther south. Among the Angami, for instance, the particularly beloved daughter who has died young is not as a matter of course buried in the ground. Probably platform disposal of the dead has over that area been common at an earlier date and been superseded by burial in the ground.

As to the importance of the jaw and the tongue which Dr. von Fürer-Haimendorf mentioned as being buried under menhirs, yawning is associated by the Chang Nagas with the soul's dancing. They take it as meaning that the soul wants to get out; they believe the soul leaves the body during sleep and comes back through the nostrils, ears or mouth when the man awakes. I cannot help thinking that the particular importance attached to the lower jaw is associated with the tongue which, though a little member, is a very important one. There is a common superstition all over the world—I have met it elsewhere than in the Naga Hills and it is probably more widespread than we realize—that to cut the tongue causes loss of life. There again I think we have indication as to why the lower jaw is thought so important. It is not only in the Naga Hills that the lower jaw is separately disposed of. There is a similar custom among the Baganda in East Africa, where a chief, on his succession, has the lower jaw of his predecessor specially treated and put in a special shrine. In West Africa also the lower jaw is separated from the head and put by itself.

A word as to slate roofs, which are seen also in the southern Sangtam and in some of the Yimsungr villages, where slate is often used for roofs, these villages being very closely allied. In the Angami country a man who has completed his Feasts of Merit may roof his house with wooden shingles, cut like pieces of slate. I suspect if slate were available he would use it. The villages which use slate are those that can get it. There is a good deal, I think, in using the material which is available on the spot. I am not sure that the use of slate is so universal in those tribes that use it as to make one certain that there is a difference of culture. It is possibly, I suggest, an alternative method, depending on the availability of a material which is not everywhere found in the Naga Hills.

An interesting point raised by the lecturer concerned bride-price. Bride-price in the Naga Hills runs everywhere with cross-cousin marriages. The tribes that have no bride-price have no cross-cousin marriages. The cross-cousin marriage seems to have arisen by way of giving a bride as compensation for a bride received, instead of some other form of payment. Where there is no bride-price, no cross-cousin marriages are found, and there is a different pattern in social life.

Dr. von Fürer-Haimendorf spoke of the use of drums or xylophones, but I think "gong" a more satisfactory word. There is a good deal of evidence to suggest that the long gongs, which in most tribes take a form similar to that of dug-out canoes, have possibly started in the Pacific as canoes and survived in these villages, where no canoes are used, in the form of a canoe used as a gong. I think that suggests north-western migration from Melanesia.

The PRESIDENT: I think it can be said without any doubt whatever that we

have all enjoyed the lecture by Dr. von Fürer-Haimendorf. To me it has been a very great pleasure indeed, because it has recalled to my mind many scenes which I have actually looked upon. I made a long tour of some 800 miles or so through the Naga Hills many years ago in company with Prof. Hutton and Mr. Mills, and I never in all my life enjoyed a trip so much.

The lecturer has touched upon a number of points which confirm the very high interest which attaches to the culture of the Nagas. Although habitually one speaks of the Naga Hills as inhabited by the Nagas as a whole, there are considerable differentiations when you come to study the various tribes, and even divisions of tribes. It is to be hoped that in the long run the various divisions of the Nagas will be studied intensively, and that eventually there will be material for a comparison of the different cultures involved.

The matter is one of geographical interest also. In many places the Nagas show links with very far distant areas. Prof. Hutton has spoken of many of them, and he has pointed out how it is possible to link up unmistakably cultures so far distant as those in the Naga Hills on the one hand with those right away east to New Guinea on the other; and also away in Melanesia one finds numbers of most striking resemblances. If there were only a few they might be called fortuitous, but they are so numerous now that one has been able to track a number of them along a chain-like route of dispersal, and the culture-linkage becomes a certainty. But up to the present it has not been easy to disentangle the ethnological make-up of the Naga Hills. There are indications here and there, mentioned by the lecturer, of tribes which appear to have been early immigrants into the region, as compared with the Angami and some of the others, who appear to have arrived later and to have brought different culture-elements with them.

The punitive expedition which was conducted so ably by Mr. Mills was most successful in its results, with very little bloodshed; and it brought out some of the qualities which one cannot help noticing amongst the Nagas—notably their emotionalism, which makes them very ready to be stirred up, but equally ready to calm down and discuss matters quite amicably. They will be foaming, literally, at the mouth at one moment and perfectly agreeable, or at least with a sardonic grin on their faces, the next.

Much has been said with regard to the stone-roofed houses, and during the lecture I also was reminded of the fact that Prof. Hutton mentioned—namely that the stone roof is not entirely restricted to the Kalyo Kengyu area. I remember seeing some few stone-roofed houses in the villages of Phozami and Pucchimi, which are southern Sangtam villages. And I remember in the eastern Angami region, in Mezalozumi, seeing instances of wooden imitations of stone-roofed houses, which seemed again to suggest a still further dispersal of the idea into a region where the stone slats were not to be found otherwise. I concluded at the time that this was due to the influence of Kalyo Kengyu culture on some of the neighbouring tribes, but it may be largely due to the fact, as Prof. Hutton has suggested, that the distribution of the materials is an important factor in the matter. In connection with stone-roofed houses there is also the curious fact that in the village of Karami, now called Laruri, which is one of the southern Kalyo Kengyu villages, as far as I remember there was not a single stone-roofed house in the whole village. All the houses were thatched. Although the stone roof still is chiefly characteristic of the Kalyo Kengyus it is not universal in all their villages.

Dr. von Fürer-Haimendorf was able to live with the Konyaks for the best part of a year. I am very glad indeed that he has done so and that he has been able to make an intensive study of their culture. When I was touring the Naga

Hills I saw a certain amount of the Konyaks in some of their villages, and it struck me then that they were one of the tribes best worth studying. Now that Dr. von Fürer-Haimendorf has made a most careful study of their general culture, we look forward to another volume being added to the series which was initiated by Prof. Hutton, and which will provide us with the sixth monograph on one of the Naga tribes. It may now be said that the Naga Hills massif is possibly one of the best documented regions in the world, and the study of the customs of the tribes is of the greatest benefit to an administration.

I should like, before closing, to mention a last point which struck me in Dr. von Fürer-Haimendorf's paper. He referred to the village of Ponyo which, although in the Kalyo Kengyu area, presents a culture which is obviously not Kalyo Kengyu but seems to belong to the Konyak group. It is one of the instances of small sections of tribes having been cut off from the main mass of their tribe and thus become isolated. There are other instances, notably the village of Swemi, where there is a similar cut-off of a small section of the Sema people. They have been separated from the main mass of the tribe and cut off as a village surrounded by Angami. Also one can recall a somewhat similar instance which has caused a split in the Rengma tribe and kept separate the western members from the eastern members. This cutting off of a section of a tribe is not an infrequent occurrence. It is liable to happen owing to various movements which have taken place within the area.

I am quite sure that you would wish to join with me in thanking Dr. von Fürer-Haimendorf for an extremely interesting lecture, and also in congratulating him, and especially Mr. Mills, on the success of the expedition which carried them into the unadministered and unknown area. It is hoped that eventually, as a result of this punitive expedition, more or less friendly relations will be established which will enable the Kalyo Kengyus also to be studied intensively.

POPULATION CHANGES IN THE COLLIERY DISTRICTS OF NORTHUMBERLAND AND DURHAM

ARTHUR E. SMAILES

Afternoon Meeting of the Society, 17 January 1938

AT the outset of this study of population in the Northumberland and Durham Coalfield it should be emphasized that over most of the region (see folding-plate, Fig. 1) the settlement consists only of mining communities, entirely dependent upon this single industry. The only exceptions are the riparian settlements on the tidal estuaries, now much more concerned with manufacturing industry and trade than with mining. There are also a few other localities where the iron and steel industry has been an important factor affecting population. Otherwise exclusively mining settlements prevail.

Mining is a form of destructive exploitation of the earth's resources, a fact which is reflected by the population cycle of colliery settlements. The stage of youth, immediately following the commencement of mining, is a period of immigration and rapid increase of population. As it passes into maturity, although population continues to increase, immigration falls off as the population already assembled becomes able itself to furnish a supply of youths for the developing industry. Maturity is passed when new developments are no longer able to provide extra work sufficient to support the whole of the natural increase in population, so that an outward balance of migration sets in. This of course may happen before coal-production reaches its maximum. The peak is passed, and population begins to decline, when the employment capacity of the industry begins to show an absolute decrease, a fate which sooner or later must overtake all mining undertakings. Depopulation is sometimes rapid, especially if new developments in some adjacent district serve to attract the surplus labour from the first. Such short-distance migration has been a prominent feature of the population history of this coalfield,[1] for a high degree of territorial mobility is in the nature of things characteristic of mining populations.

The simple sequence just indicated may be modified at any stage by rejuvenation of the life of the settlement, involving a renewed steepening and upward trend of the population curve. Rejuvenation reflects an intensification of mining activity, carried out either by the extension of existing units of production to new and deeper seams, thus giving them a new lease of life, or by the establishment of new collieries sufficiently near to existing centres of population to be conveniently accessible without causing their displacement.

From this introduction we shall now turn to a summary of the process of mining colonization in the colliery districts of Northumberland and Durham,

[1] An early instance recorded was the removal of some three hundred miners and their families from Plessey, when the colliery closed in 1813, to Cowpen, 4 miles away, where a new colliery had recently been established. (E. Mackenzie: 'View of the County of Northumberland,' 1825, vol. 2.)

upon the detailed study of which the foregoing generalizations have been based.[1]

Although the production and shipment of coal from this coalfield have been important since the sixteenth century,[2] yet even as late as 1801, when the first Census was taken, most of the coalfield was still rural. True, there were on the estuaries of the Tyne and Wear, and to a much less degree at Blyth and Seaton Sluice, busy commercial and industrial communities, whose activity was based upon the coal produced nearby. But only where good household coal was easily accessible within 3 or 4 miles of tidewater did collieries, waggonways, and rows of pitmen's houses appreciably alter the prevailing rural aspect of the landscape (see folding plate, Fig. 2). Even here industrial settlements were small and scattered except in the immediate vicinity of the river banks, and outside these partly industrialized districts the scattered outcrop workings for local land-sale scarcely affected the agricultural tone of the countryside and population. The area which in 1801 had a population density of more than 200 per square mile closely corresponds with the extent of the region within which industrial communities were already present (see folding plate, Fig. 3). Its margin appears as a zone of discontinuity in the population density, beyond which the density over the greater part of the coalfield was generally considerably below 100 per square mile, except in the south-west where land-sale workings, although very small, were sufficiently numerous to bring up the density to approximately 100 per square mile.

Within the mining area important shifts of population had been in progress for some time, and already in 1800 we must distinguish between those districts which were new and developing and experiencing immigration and other areas which were old and declining. The old district above the Tyne Bridge, where estates bordering the river had been exploited for centuries, had passed its zenith early in the eighteenth century. The decline here led first to an outward extension of mining into areas where, although the cost of transport to the river was greater, the coal was still shallow and accessible. Mining hamlets such as Tantobie and Dipton thus sprang up in the eighteenth century on the high plateau of north-west Durham some 8 or 9 miles from the river. Later in the century however deeper mining, made possible by the application and improvement of the steam pumping-engine, caused the centre of production to shift eastwards in the direction of the dip. New pits were sunk east of the Tyne Bridge, where the coal was deep but of excellent quality, and the pits very near the river. The villages which appeared beside the new collieries were often almost on the river banks. As an example we may cite the birth of modern Wallsend, which dates from the sinking of the first shaft of the famous Wallsend Colliery in 1780.[3] Population from the western districts was also moving to the developing region on the Wear, west of the Magnesian Limestone escarpment, and close to staithes on the river below Chester-le-

[1] Detailed statistics are provided by the parish figures of the successive Census Reports, 1801–1931.

[2] A. E. Smailes: "The development of the Northumberland and Durham coalfield," *Scottish Geographical Magazine*, vol. 51, No. 4 (1935).

[3] W. Richardson: 'History of Wallsend' (1923). The germ of modern Jarrow appeared somewhat later, in 1803, when Jarrow colliery was opened.

Street. Here also population was increasing rapidly at the end of the eighteenth century.

Between 1801 and 1831 the population of the coalfield increased by 60 per cent., but immigration from outside was not yet important (see folding plate, Fig. 3). The increasing labour requirements were supplied by the natural increase of a prolific population.[1] The increase was largely concentrated moreover within the existing mining area. The unindustrialized countryside of 1800 for the most part preserved its rural character thirty years later. But in the mining area transformation proceeded, and was accompanied by a continuance of migration from districts where industry was stagnating or declining to those where it was in full development.

In the old districts west and south-west of Newcastle, which shipped their coal above the Tyne Bridge, the population total was practically stationary. Development here was at a standstill, and the natural increase of population was drained off to newer areas farther east on lower Tyneside and the Wear. Lower Tyneside reached the floodtide of its prosperity as a coal-mining area at the beginning of the nineteenth century, and by 1820 the ebb had set in. Employment was contracting and miners were moving northwards to the new mining villages which sprang up north of the Ninety Fathom Dyke. Meantime the Wear district was prosperous and population was increasing fast, thanks to the happy coincidence of the beginning of the exploitation of the Hutton seam here with the exhaustion of the High Main seam on Tyneside. Associated with this development there was a pronounced shift in the centre of production from the older districts near the staithes towards newer areas farther south and south-east, where there was greater scope for new enterprise. Some slight extension of the limits of the producing area also took place on this side. Population growth in the period 1801–31 became to an increasing extent concentrated in the south-eastern parishes, while at the same time the rate of increase was accelerated.

Although the first winning through the Magnesian Limestone was made at Hetton in 1822, conditions on the east Durham plateau altered very little before 1830. The area remained essentially agricultural, and population was increasing very slowly except at the new port of Seaham Harbour, founded in 1828 to serve new collieries in the above-mentioned district farther west.

In the south-west corner of the coalfield a new era dawned in 1825 with the opening of the Stockton and Darlington Railway, which was constructed to give the small land-sale pits of this district an opportunity to produce for shipment. Up to 1830 development and influx of population were confined to the area south of the Wear traversed by the main line and the Eldon Branch. Once the practicability of developing the coal trade from the Tees had been demonstrated, other projects for opening up new districts lying south and south-east of Durham City were carried out immediately.[2]

The features which appeared in the 'twenties foreshadowed a new phase of economic development and settlement history. With its active railway

[1] Poor Law Commissioners' Report, 1834. App. A, Pt. I, No. 5, p. 130; No. 11, p. 320.

[2] W. W. Tomlinson: 'The North Eastern Railway' (1914).

construction, and its sharply rising demand for coal, and especially for new types of coal,[1] the period which follows is one during which the industrial development in the Northumberland and Durham Coalfield may veritably be described as a revolution. New and expanding markets provided the incentive, and new transport facilities the means, for a great extension of mining and with it an influx of population into rural districts (see folding plate, Fig. 4).

The second quarter of the nineteenth century is the great period of mining extension and colonization in this coalfield. Population leapt from 300,000 in 1831 to nearly half a million in 1851, an increase far in excess of the natural increase. A new feature appears—a large balance of inward migration entering the coalfield from outside. Immigration was given an early impetus by the demand for labour occasioned by the great strike of 1832. At first much of the influx was provided from the Pennine lead-mining districts; another early source of recruitment was supplied by the depressed condition of linen-weaving in the North Riding.[2] The prevailing prosperity in the coalfield was not however universal, and internal migration persisted. Part of the population of the new settlements was drawn from those which were on the downgrade of a population cycle.

Until the middle of the century the growing demand for household coal was still a powerful stimulus to development. Opened up by railways, the newer districts in the hinterlands of Sunderland and new coal ports at Seaham Harbour, the Hartlepools, and on the Tees benefited by the Tyne's default in this trade. Among these extensions was the invasion of the east Durham plateau by the mining industry. Referring to this region, a contemporary said in 1841 "Within the last ten or twelve years an entirely new population has been produced. Where formerly there was not a single hut of a shepherd, the lofty steam-engine chimneys of a colliery now send their volumes of smoke into the sky, and in the vicinity a town is called, as if by enchantment, into immediate existence."[3] At least some share of the large population increase in the parishes concerned represented transference from the northern part of the area between the Wear and the Magnesian Limestone plateau, where population was now decreasing.

In the population statistics of lower Tyneside, northward movement of miners from the now almost exhausted household coal district south of the Ninety Fathom Dyke is obscured by the increase of population due to the growth of other industries along the riverside. It seems certain however that the growing mining settlements farther north recruited from here, as miners have generally been more ready to change their work-place than their work.

The first extension north of the Dyke had been for household coal, but the amount of High Main coal was very limited (Fig. 1) and the lower seams proved unsuitable for this market. The rapid growth in the market for steam coal, particularly after the removal of the export duties, provided an alter-

[1] Types with properties rendering them specially suitable for generating steam, for making metallurgical coke, and for making gas.

[2] A. Redford: 'Labour migration in England, 1800–50' (1926).

[3] Report of Child Employment Commission. 1841. App. I, p. 143.

native upon which the Northumberland coalfield's later prosperity has been based. The more southerly districts were developed first, thanks partly to the advantage of an early start, but the primary factor was relative accessibility to the Tyne, as the unimproved estuary of the Blyth was of little use. There was however a small outlying region of new development in the extreme north, near Amble.

Meantime, some resuscitation of mining in north-west Durham and south of the river on upper Tyneside had begun, thanks to the railways and the demand for steam coal, and especially for coking coal, provided by industrial development on Tyneside and at Consett. The margins of the mining area were pushed out to the south and west, and new settlements appeared. In the south-west corner of the coalfield the full benefit of the new railways was now being felt, and with the provision of additional lines enabled a great increase in mining activity and large immigration, first into the small but intensively worked area of good household coal just east of Bishop Auckland (Figs. 1 and 4), and into the area south-west of Bishop Auckland. In this latter district the first peak was soon reached. In the 'forties however the principal scene of new operations and most rapid development and population influx was on the north side of the Wear valley, north-west of Bishop Auckland.[1]

During the second half of the century rapid increase in population and immigration into the coalfield continued. Between 1850 and 1880 mining made further encroachments upon districts previously rural, but intensification of production in existing areas, with associated rejuvenation of their population cycles, was even more important (see folding plate, Fig. 5). The boom in the coking coal trade, which accompanied the establishment and immediate phenomenal expansion of the iron industry on Tees-side, was reflected by a renewed outburst of activity in the south-west corner of the coalfield, where population embarked upon a new cycle of growth. Vigorous expansion meanwhile proceeded in the somewhat younger area north-west of Bishop Auckland, and, still farther north, the more remote and hitherto untouched region west of Durham City was now added to the industrial region. At the same time a change over from household to coking coal production allowed the prolongation of the stage of youth in the population cycle of the mining villages east of Bishop Auckland.

In the old district of north-west Durham the industry was in full revival during the second half of the century. This district, possessed of excellent qualities of coking, steam, and gas coals, benefited from the expansion in all these markets. A general and rapid increase in population was therefore in progress in these parishes.

In Northumberland intensification was also taking place. Detailed investigation of the colliery history and course of population in individual parishes shows that development here was somewhat spasmodic in character. The opening of a new colliery or sinking at an existing colliery to a new seam would

[1] This district was first penetrated by a railway in 1840, when the Byers Green branch of the Clarence Railway was extended across the Wear. Soon after, the Stockton and Darlington Railway entered this new field by means of the Shildon Tunnel.

cause an influx of workers and the birth of a new settlement or the addition of some colliery rows to an older village; then, until another such development took place, the population would remain more or less stable. The course of population in the township of Seaton Delaval may be noted as being typical (Fig. 6).

The mining village of Seaton Delaval dates from the commencement, in 1838, of an extensive winning in the south-west corner of the Seaton Delaval estate. With the opening of the Hester Pit in 1846 the influx of population into the township acquired fresh momentum. In 1862 however a terrible mining disaster occurred at the pit, causing the cessation of mining, and population began to decrease as the miners moved elsewhere to find work. The opening of New Hartley Colliery, in 1872, caused a new influx and gave birth to a new mining settlement to the north-east of the older village. During the 'eighties however population increased only slowly, but the sinking of shafts to the Low Main seam in 1895 ushered in another period of rapid growth. Such developments however were not only spasmodic in character but also rather sporadic in their occurrence. Although the field of production was considerably enlarged by the exploitation of new royalties, especially north of the river Blyth, it is not possible to recognize clear zones of contemporaneous development and population growth.

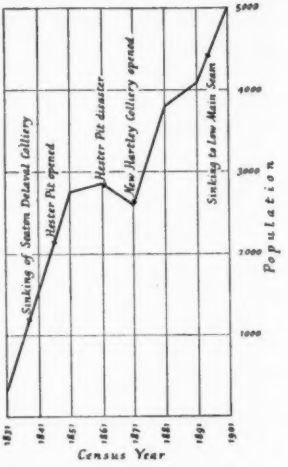


Fig. 6

In east Durham household coal had not long remained the basis of the region's prosperity, for by 1850 the new railways were allowing this coalfield to be supplanted in the London and south of England markets by the Midland coalfields. Production did not however decline, for an outlet for increased output was found in the demand for gas coal. Indeed, in some of the northern parishes in this region, where population had for some time been decreasing, a new cycle of growth began (cf. Figs. 4 and 5). On the plateau the period after 1850 is marked by the intermittent [1] growth of previously established centres, rather than by creation of new mining settlements, of which only four [2] sprang up in the period 1850–1900.

In north-east Durham mining villages appeared after 1850 in an important extension of the field. Development had been held up here because the Hutton seam was rather too soft and friable for household use, although valuable for making gas. On the other hand, that part of mid-Durham lying immediately east and south-east of Durham City, after its relatively short period of prosperity as a household coal district, has had little

[1] In most cases periods of arrested growth of varying length were experienced, so that the population graphs show indications of more than one cycle.

[2] Ryhope, New Silksworth, Wheatley Hill, and Deaf Hill.

share in later developments, and since 1850 the population has shown little change.

After 1880 there was little scope left for further extensions of the mining area (see folding plate, Fig. 7). The principal subsequent additions were in the north, where improvement of the port of Blyth encouraged large-scale mining colonization in the Ashington district in the decades before the War; and in the south-east, where the appearance of large new colliery settlements [1] since the beginning of this century is attributable to progress in the technique of sinking, and to the building of a coastal railway.

In many districts of the coalfield however deep-mining provided the basis for further immigration. In north-west Durham, for example, in spite of long and vigorous exploitation, the wide range of valuable seams allowed continued expansion. The same period also saw an intensification of activity in the gas coal district, with further revival of older areas near the Wear and an acceleration of population growth on the plateau. In the south-west of the plateau, within the coking coal region, the Ferryhill district also showed a rapid increase, but for the most part the rest of the coking coal region was no longer experiencing immigration.

Thus we see that the history of settlement has been far from uniform over the coalfield, and that there have been pronounced regional variations both in the date of commencement of the industrial cycle and in the number of cycles experienced and their relationship to each other. These differences, which are further illustrated by the population graphs of sample parishes in Fig. 9 (see folding plate), are ultimately related to the geological structure as it affects the coal resources and their accessibility; to the distribution of different types of coal, and the development of their respective markets; and to the situation in relation to transport facilities. It is submitted that such a study of the historical geography of settlement provides a background which is important for a full appreciation of the present trends of population, as well as the relative incidence of the unemployment problem in this coalfield.

In this connection it should be remembered that the accomplishment of the later stages of the population cycle depends upon the possibility of migration, through the absorption of the surplus labour by developments elsewhere. In the past this has been a feature of the settlement history of the region, and we have stressed the part played by internal movements of population. Since the War however the decline has been so general that this condition has been little in evidence, and a large residue of unemployed at present lingers in districts where mining cannot absorb it again.[2]

Population is still increasing in the "young" regions, north of the Blyth and in the south-eastern coastal area, the scenes of the most recent extensions (Fig. 8). But these developing areas cannot absorb more than a mere fraction of the surplus existing in other districts. Except locally, the remainder of the coalfield is at a stage past the peak of a population cycle, and the rate of decrease is held in check only by the difficulty of finding work elsewhere, and by the provision of unemployment benefits which have somewhat diminished the

[1] *E.g.* Easington Colliery and Horden.

[2] 'Industrial survey of the North-East Coast area' (H.M.S.O., 1932).

By courtesy of "The Times"

1. A distressed mining settlement in south-west Durham, dominated by the pit-heap of a disused colliery

2. Back of an old colliery row with kitchen gardens

3. Old cottages at Shiney Row

4. Prevailing type of pitmen's dwelling, close to the pit-head

mobility of miners. Most of the surplus population, living on the dole, remains stationary, except for the small proportion disposed of by transference to other coalfields and other industries.[1]

At the present time the relative importance of emigration, far from indicating the extent to which a solution of the problem has been reached, is simply an index of its relative acuteness. The incidence of unemployment remains most severe in the very regions from which recent migration has been most in evidence. These districts are in fact those at the most advanced stage of the current population cycle. They are old districts in terms of this cycle, but not necessarily those where mining has been carried on longest. Tyneside was the first district to experience large-scale mining activity, but Tyneside is no longer dependent directly upon the coal-mining industry for employment. Other industries are now far more important. North-west Durham is also an old district, but the wide range of seams has given longer life to this mining district, through the possibility of rejuvenation afforded by working deeper seams. The population is also less exclusively engaged in mining—there are other industries, notably iron and steel at Consett, and, being near Newcastle, the region is to some extent affected by residential development.

The most depressed region is the south-west. The resources of this region, near the edge of the coalfield, were not sufficient to maintain for long the intensive exploitation which had begun here before the middle of last century. Since 1880 this area has shown little capacity to absorb the natural increase of its population (Figs. 7 and 8). In recent years the abandonment of mines which were approaching exhaustion has been precipitated by the depressed condition of the industry and the serious water problem, which has aggravated the difficulties of the region.[2] After the strike of 1926 a large outflow from the district set in, but this movement has since been retarded by the general depression. Some of the villages here are now quite derelict, without any hope either of mining revival or of the establishment of any alternative means of gainful employment. Plate I conveys, better than words, an impression of the environment in which these communities live. The only solution to the social problem they present would seem to be transference of their population to more prosperous areas. Other measures can merely be palliatives. In the more flourishing past of the developing coalfield, short-distance migration would have taken place of its own accord; assisted and longer range migration is now required.

It remains to be pointed out that the date of colonization is perhaps the most important of the factors determining the form and pattern of existing settlements over the coalfield. The main distinctions in the appearance and lay-out of the settlements reflect the differences which we have noted in the process of mining colonization during the last century.[3] Not only is this so

[1] G. H. J. Daysh: "Economic problems of the North-East Coast," *Geography*, vol. 22, Pt. 2 (1937).

[2] A. M. Hedley: "Mineral survey of coal-mines in S.W. Durham." Report to South-West Durham Reconstruction and Development Board (1936).

[3] Few traces of still earlier mining settlement survive. They have been either effaced by demolition or obscured by later agglomeration, especially as the principal scenes of early mining were within the area now covered by the Tyneside conurbation.

because of changes in the type of pitmen's dwellings, such as the contrast between the old cottages, usually built of rough stone, single-storied (but sometimes having front garrets), and with long sloping roofs of red tiles (Plates 2 and 3), and the more recent and much more general rows of two-storied brick dwellings, roofed with slate (Plate 4). Other differences in the pattern of settlement may also be related to the time and nature of the colonization.

Mining development has been accompanied by an increase in the average size of the units of production. In the early exploitation of the shallow seams

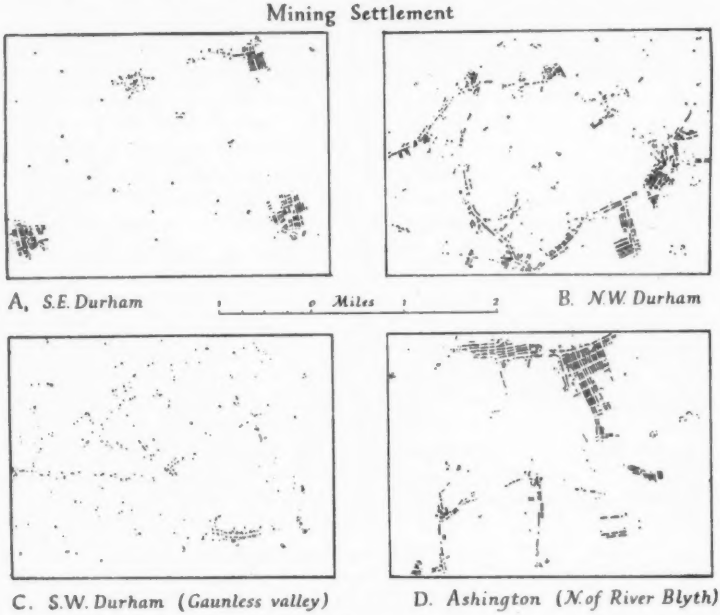


Fig. 10

in the outcrop section of the coalfield, pits were often duplicated to avoid pursuing workings far underground. The greater multiplicity of pits thus associated with the earlier as compared with the later stages of mining development, and with the outcrop as compared with the buried coalfield, is reflected in the more straggling and nebulous pattern of the dependent settlements (Fig. 10). In the Gaunless valley, near the outcrops in the south-west corner of the coalfield, the scale of mining has remained very small; hence the dispersion of settlement illustrated in Fig. 10 C.

More recent developments have been generally on a much larger scale, and the large modern collieries, often working at a considerable depth, concentrate their dependent populations in compact settlements nearby. In east Durham, from the first, the difficulty and expense of sinking shafts

through the Permian strata necessitated working large areas from a single centre, and the mining settlements thus became characterized by their compactness and their separation from each other. The distinctiveness of mining settlement here lies in the fact that this is the only type represented (Fig. 10 A). Large compact masses of dwellings have also sprung up as a result of the more recent developments in the exposed coalfield (Fig. 10 B and D), but they are there often superimposed upon an earlier and much more dispersed settlement pattern, and the mining villages are therefore generally less distinct.

In those parishes where the population graph shows a single and steep upward course, indicating mushroom growth at one period, the buildings are architecturally uniform, the accommodation for the workers having been planned and built *en masse*. Where the development has been more prolonged or has taken place in stages a greater variety in dwelling-types and lay-out results. Rejuvenation of the population cycle is often clearly indicated by the presence of obviously later accretions of different construction and lay-out alongside the older part of the settlement (Fig. 10 B). While architectural variety and a more irregular plan are not without some aesthetic advantages as compared with the depressing sameness of crowded masses of parallel colliery rows, standing in monotonous and regular array, too often both alike are immediately overshadowed by pit-heads and mountainous pit-heaps, and adjoined by ugly tracts of kitchen gardens with their ramshackle sheds and fencing.

DISCUSSION

Before the paper the PRESIDENT (Professor HENRY BALFOUR) said: The paper this afternoon, by Mr. Arthur Smailes, is on a matter of great economic interest, and I hope it may lead to a full discussion. I have much pleasure in calling upon Mr. Smailes to address you.

Mr. Smailes then read the paper printed above, and a discussion followed.

The PRESIDENT: I will ask Professor Taylor, who has been making a detailed study of economic distribution of population, to open the discussion.

Professor E. G. R. TAYLOR: I should like to congratulate Mr. Smailes on his study; it is particularly welcome during the present industrial depression and at a time when some move is being made to try to solve the problems to which industrial depression gives rise.

There are three points on which I should like to question Mr. Smailes. First, a point of criticism of his nomenclature in that he speaks of the cycle of population changes in mining settlements. A cycle, as I understand it, is a change that recurves upon itself, whereas, as Mr. Smailes explains it, in these mining settlements the changes do not recur: the population advances to a maximum and diminishes and, instead of passing through the minimum and returning on itself, it comes to an end and the village becomes derelict. There is the well-known example of the silver-mining settlements in Nevada, U.S.A. What Mr. Smailes describes appears to be a hemicycle rather than an actual cycle as a result of which we might hope for some recrudescence of prosperity.

Then I should like to ask Mr. Smailes if he has figures for the proportional make-up of what he terms a mining settlement. That is to say, the percentage of occupied persons who are actually engaged, or who would be engaged in mining, who are by trade miners. From some figures that have been given me by Dr. Selwood I understand that in Ireland, for example, of occupied persons

there may be 80 per cent. or more engaged on the land, whereas for our English and Welsh communities the proportion of people actually engaged in industry (*i.e.* manufacturing) does not appear to rise higher than 60 per cent. or, at most, 65 per cent. And in what we term a fishing community the number engaged in fishing is not more than 30 per cent. We know that the more mixed the community, the more varied the classes and categories among occupied persons, and the more hopeful the situation in respect of employment. Therefore, if he can give it, I should like from Mr. Smailes the figure of the proportion of occupied persons who are actually miners in these villages.

A third point that has arisen concerns the mobility of population. I wonder if Mr. Smailes could give a figure for the range of free migration of a population which is suffering from unemployment; and I wonder also if he can tell us whether there is any contrast between the voluntary mobility of a rural mining population as compared with that of an urban population. We are accustomed to think of rural communities attached to the land as not being at all freely mobile; they may be mobile in the sense that they can move, but by sentiment they are not freely mobile. I should like to know whether there is the same sentiment among the people in the derelict villages which, Mr. Smailes says, may never again provide employment? Is there that sentiment of attachment which makes the people resist and resent anything in the nature of forced transfer or assisted transfer such as, I think, is in the minds of our legislators to-day? One is perhaps too apt to think of people in terms of numbers and talk of transferring one hundred here and one hundred there without regarding them in terms of flesh and blood, as people who are attached to a neighbourhood where they have their associations and their friends and to whom removal would, perhaps, be as great a hardship—a more severe hardship indeed, than their suffering through prolonged unemployment and lack of hope for the future.

Dr. R. Ogilvie Buchanan: I feel that my own contribution must be merely in the nature of congratulation to Mr. Smailes on what I regard as a stimulating treatment of a subject which is not always treated geographically. Population as a topic has of course interests for many lines of study. Probably the most immediate interest is the statistician's, and the temptation to a geographer to be only a statistician when he comes to tackle population must, I think, be considerable. I congratulate Mr. Smailes upon successfully resisting that temptation. I have been much struck by his dynamic concept of the development and the final decay of population in the mining villages as associated with fundamental geographical conditions in the district concerned. I have been more struck by the specific way in which Mr. Smailes has worked out his actual results. I feel that this is at the same time a contribution to our knowledge of the area and also to our technique of the geographical study of population.

Mr. E. W. Gilbert: I should also like to congratulate Mr. Smailes on his paper. Of course it is largely a paper on historical geography, from the population point of view. And growth of population is due, primarily, to two causes: the natural increase in population, and migration from other areas.

In Oxford, under a Committee of Barnett House, we have been carrying out a co-operative investigation of the extraordinary increase of population which has taken place there since the war. At the present day the increase of population that is due to migration can be quite accurately assessed, because in Oxford we have examined the unemployed insurance book of every worker. Thus we can tell exactly whence each migrant has come. A certain number have come to Oxford from the area Mr. Smailes has been describing to-night.

I would like to ask Mr. Smailes how far he is able to assess for the earlier part of the nineteenth century, say 1820–40, the proportion of increase in his region

that was due to migration, and that which was due to natural increase. He rather stressed the importance of migration and I wondered whether he had any precise figures to explain this point.

The PRESIDENT: We have had an extraordinarily interesting paper on a very important economic question, and the whole problem has been put before us in a very clear manner. The paper will provide some very useful material, especially when that derived from this single area can be brought into relationship with similar statistical matter obtained in other areas.

There is one side issue which comes into one's mind, and was suggested by the last paragraph of the paper: what can be done to recondition the land which is left derelict after the mining industry has passed away from that particular area? A mining centre is never a very attractive scene, but a derelict mining centre is as unattractive as anything can possibly be. Close attention to the possibilities of reconditioning derelict land is a matter of some considerable concern, because if the land can be reconditioned, and its amenities restored to it, there is the possibility that population may be attracted back into the region.

I will now ask Mr. Smailes if he will reply to the questions which have been raised in the course of the discussion. When he has done that I am sure you will wish to thank him very heartily for having made so close and intensive a study of this one particular area and for having told us so much of importance with regard to it.

Mr. SMAILES: I should like to plead justification for my use of the term "cycle" as applied to the population history of the colliery settlements. My examination of the population changes has shown the sequence of stages—a period of increase, the passing of the peak, and then decline; but, quite characteristically, the decrease was checked and population launched upon a new period of growth. So that we have one cycle, as it were, following or superimposed upon another. What is distinctive about the present position is that there is little or no sign of rejuvenation. Whereas in the past the latter stages of the cycle in one district coincided with the earlier stages in another district, so that a shift of population naturally resulted, practically the whole coalfield is now on the downgrade of the cycle. But the *tempo* of the cycle has slowed down very considerably. There is no longer the attraction of mining employment in nearby districts, and there is now State provision for the unemployed.

The second point is with regard to the proportion of the total working population which is employed in mining. I have with me some figures which I have calculated from the 1931 Census returns for the various Urban Districts in the region, and they show how large a proportion of the working population is engaged in the mining industry. Typically, over 50 per cent. of the working population is so employed, and in some instances the proportion is as high as 70 per cent. If we also take into consideration those engaged in activities such as the provision of services associated with the presence of the mining population, we realize how very dependent the communities are upon the single industry.

The third point concerns the mobility of the mining populations. Professor Taylor has asked if there is any distinction between the mobility of rural and urban populations. In this region the mining population is, in fact, divorced from the agricultural exploitation of the land. The villages are urban in character, for the population is not concerned with agriculture, as for example it is in the adjacent lead-mining region of the Pennine dales, where the miners have often been small farmers. In the coalfield there is not this motive for attachment to the region. I much doubt whether the population produced by the nineteenth-century immigration has to any great extent developed roots in the region.

I stressed the importance of voluntary migration in the past. In one sense that migration was voluntary in that it was decided upon entirely on the initiative of the persons concerned; but, before the days of unemployment benefits, when a mining community passed the zenith of its prosperity the miners had either to move elsewhere or starve. From this standpoint the movement was compulsory. At the present time the inducement to move is often no greater than the inducement to stay. And we must remember the personal and social problems involved in connection with transference—shifting the miner and his family involves, for instance, the provision of housing accommodation at the new place of work.

Finally, there is Mr. Gilbert's question as to the possibility of assessing definitely the amount of the population changes which have been due to migration as distinct from the natural increase. I am afraid that I have unfortunately been unable to separate the two factors with precision. Separate figures for migration and for the excess of births over deaths are not available for the earlier period for the purpose of this type of detailed study.

ACROSS THE GREAT MAKARIKARI SALT LAKE

SIR BEDE CLIFFORD

NOTE.—*In 1931 Sir Bede Clifford made a third journey into the Kalahari Desert, to explore the upper reaches of the Nata river, and examine the centre of the great Makarikari salt pan. The notes of his journey were, on his transfer from South Africa, mislaid for a while but are now recovered, and have recently been communicated for publication, to complete the record of the work.*—Ed. *G.J.*

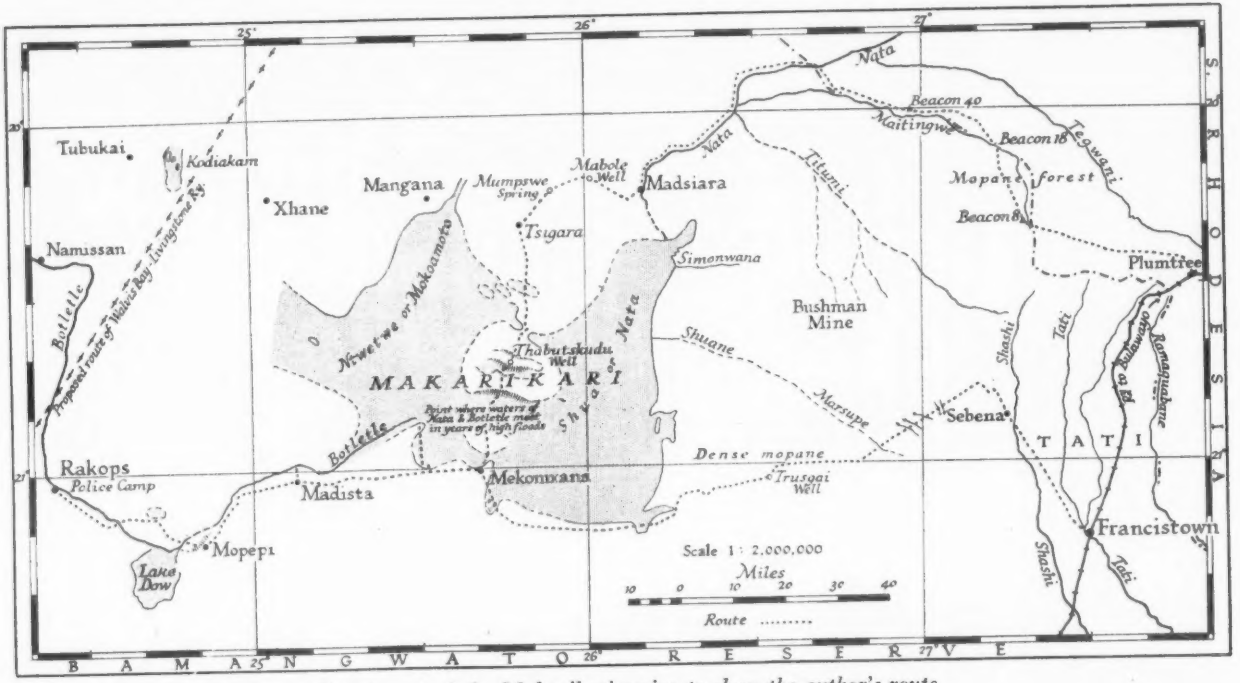
ABOUT the middle of July 1931 my party left Plumtree in Southern Rhodesia for the Makarikari Lake and the Kalahari Desert on my third and probably last expedition into those regions. My first expedition was mainly concerned with motor transport and tsetse fly questions;[1] the second (1929), which was partially financed by the Government of South Africa, was undertaken with the object of locating approximately the position and limits of the vast Makarikari Salt Lake in order to estimate to what extent, if any, it would be likely to interfere with the proposed railway from Rhodesia to Walvis Bay.[2] The present and third journey was made in connection with mining and administrative questions, and the present paper is concerned with the geographical information obtained in the course of the expedition.

Before I set out upon my 1929 expedition little or nothing was known of the position or the extent of the great Makarikari Salt Lake, although the exploration work which I have since carried out has shown that it covers a very large area (circumference about 600 miles) and that its eastern shore is only 130 miles from the railway running through the Protectorate. There were available at that time several different maps of the Protectorate, but on each of them the position and shape of the Makarikari Salt Lake was shown differently. Moreover, although the Bechuanaland Mining and Exploration Company had opened up the Bushman Copper Mine less than 50 miles from the eastern shore of the lake and had built a road from the mine to the railway, there is no evidence to show that any of their prospectors had ever visited the lake itself.

The country to the north of the lake appears to have been better known. On a baobab tree near Mumpswe I found the date and initials of a pre-war visitor who was probably only one of a small number of explorers to penetrate into these open grassy plains from the historic trail known as the Old Hunters Road, which now forms the boundary between Southern Rhodesia and the Bechuanaland Protectorate.

Our small party, on leaving Plumtree, set out in a westerly direction and before nightfall struck the fence, which follows the general course of the Old Hunters Road, near beacon 8. These beacons are not survey beacons, but merely identification numbers on the fence posts. The fencing party followed the general course of the old trail, but ignored its minor bends and turns, with the result that portions of the road appear on both sides of the fence. A rough but serviceable motor track has been blazed on the Protectorate side of the fence, but it is not at present possible to motor along the Southern Rhodesian

[1] *Geogr. J.* 73 (1929) 342–58.
[2] *Geogr. J.* 75 (1930) 16–26.



Sketch-map of the Makarikari region to show the author's route

side. It is unlikely that compass bearings were taken by the fencing party, and the so-called "beacons" are merely numbers painted on selected posts at regular intervals, and it is probable the distance between them represents the length of a coil of fencing wire. They appear therefore at regular intervals, but the intervals between the beacons east of No. 18, which is the point where the Maitingwe river crosses the border, are greater than the distance between beacons 18 to 40, probably owing to the use of shorter coils of wire on the westerly section. The fence ends at beacon 40, but after that point hollow iron posts have been driven into the ground approximately one mile apart, and were encountered all the way to the point at which the Nata river crosses the boundary. Here we left the road and turned south-westwards along the Nata river.

Astronomical observations taken at beacon 8 showed that this point is inaccurately placed on the large-scale sheet-map recently published by the Southern Rhodesian Government. Although the same map shows a cadastral survey some 10 or 12 miles to the east of beacon 8, it is apparent from the magnitude of the error in the position assigned to the boundary in this vicinity that it has not been linked up with the above survey. The remainder of the boundary, so far as we traversed it, is also inaccurately shown on the Rhodesian official map (about $4^1/_2$ miles to the inch but given in Cape roods), and it is obvious that in the absence of any accurate information the boundary was only roughly indicated. The coordinates shown on my map were carefully checked, but although occasional compass bearings of the fence were taken between these stations in order to assist in determining the general direction of the boundary, there was not sufficient time to make a careful compass survey of it. The ascertained positions of the points where the Maitingwe and Nata cross the border and of the junction of these rivers differ very considerably from those shown on the Rhodesian map.

It might be as well to refer here to the manner in which the map was prepared. On arriving in camp at nightfall the theodolite (a Wild Universal) was set up, and after an interval sufficient to allow the instrument to assume the temperature of the air, it was carefully levelled. Wherever longitudes and latitudes are shown together in pairs they represent the mean of a number of observations suitably placed of east and west stars for longitude, and north and south stars of suitable elevation for latitude. Where latitudes and longitudes are shown separately, these are sun observations carefully taken but not checked. If a pair of longitude observations differed by a second or more in time, further observations were taken to eliminate faulty results.[1] Special time signals were kindly sent out by the Union postal authorities from Slangkop and Walvis Bay, but in spite of the proximity of these stations, particularly the latter, we often found it much easier to pick up Eiffel Tower signals from Paris. We used a small portable Marconi set with a short-wave converter, and never failed to pick up a time signal in the course of the night. Nearly all our signals were obtained over the short wave; we found the long-wave signals very susceptible to atmospheric interruption and generally unsatisfactory. The labour of obtaining signals is greatly simplified if the

[1] It has not been possible to include these observations on the accompanying sketch-map.

operator understands Morse and has experience in selecting stations. I was fortunate in having the service of a capable official of the Capetown Wireless Telegraph Company.

The chronometer was usually checked with Paris to the nearest half-second, and all observations were also timed to the nearest half-second, with the result that our east and west star observations gave a very small margin of difference.

The country between the Protectorate Railway and Nata river is for the most part dense mopane forest. The grass on the Southern Rhodesian side was tall but on the Protectorate side of the boundary fence it was badly overgrazed by native stock. Until we reached the Nata river very little game was encountered, though curiously enough wild dogs appeared to be fairly plentiful. One night when the air was still I was given an excellent demonstration of the manner in which, I believe, these animals hunt. They appear to advance in a line with intervals between each animal, contact being maintained vocally. In this way they are able to explore as much ground as possible. A single dog appeared to discover our camp (in which a recently shot buck was hanging) before his mates, and immediately emitted a melancholy howl. This howl was passed along the line to both the right and the left of the camp, becoming fainter and fainter in the distance. Indeed if it were not for the flatness of the country and a slight variation in the tone and volume of the howls I might easily have been deceived into thinking that the effect was produced by an echo. Any doubt on this point was removed as the dogs on the wings appeared to converge on the camp, in answer to the calls of the dog which discovered it. Such a manoeuvre could account for the rapidity with which these brutes locate a wounded animal, though no doubt the direction of the wind and the smell of blood greatly assist. But, whatever the explanation may be, there can be no doubt that for the most part they hunt in packs with short intervals between each dog and track down their prey with uncanny speed.

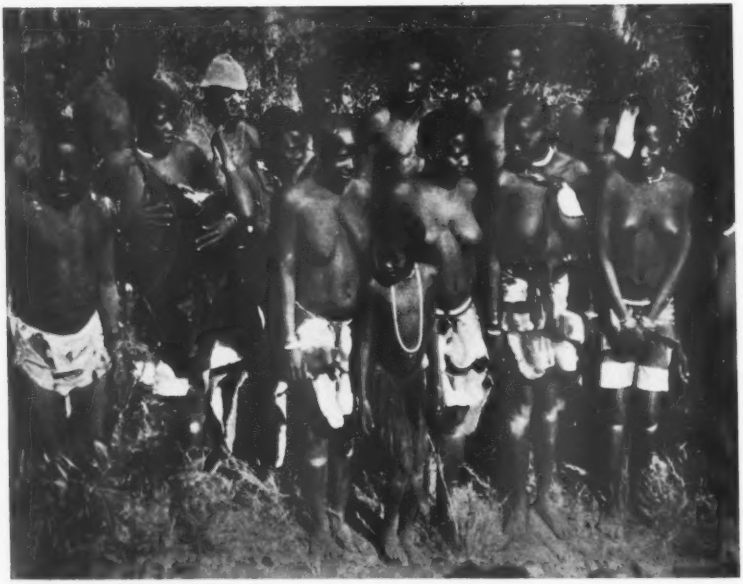
Much the same system seems to be employed by vultures. I have fortunately been able to compare my own experience of the methods employed by these birds with those observed by Colonel Sir P. Van Ryneveld and members of the Union Air Service, who have made a special study of the habits of vultures from the air. They seem quite satisfied that vultures depend on an organized system of patrol, which they employ to keep vast areas under observation in order to locate carrion, rather than upon far-reaching vision or any other highly developed sense. Officers of the Air Force report that these birds fly in layers. Above the first layer is a second layer of birds greatly reduced in number and apparently of greater age. Above this layer there appears to be another and sometimes even a fourth layer composed of still older vultures. When on patrol these birds remain comparatively stationary in the sky. Like the albatross, they seem to understand, and be adept at utilizing, air currents to maintain their position with very little movement of the wing. Carrion is usually first sighted by a bird in the lowest plane. The discoverer thereupon descends upon it and those near him or above him observe this movement and converge on the point indicated and by so doing in turn indicate the locality of the prey to those more distant,

Ox drawn sledge crossing the grassy flats of the Makarikari region north of Mopepi

Lorry sunk in the salina of the Makarikari

Water covered region of the Makarikari near the point where the Nata river enters it

Edge of the mopane forest near the south-east corner of the Makarikari



Bechuana natives from near Rhodesia border

with the result that large numbers of vultures collect around a dead or dying animal in a very short space of time.

In studying the habits of vultures the pilots have conducted some interesting experiments. When "on patrol" a bird soars about and appears so intent on observing the ground beneath him, that it is possible to shut off the engine and descend so close upon him as to almost touch him with the wing of the aeroplane before he becomes aware of its proximity. But after the first manifestation of surprise vultures appear to ignore the aeroplane, and from this evidence it may be concluded that their hearing is not very acute and that experience has taught them that they have nothing to fear from any other bird.

The problem of how bushmen find their way over vast areas of apparently featureless country has caused nearly as much speculation as the problem of bird migration, and it may be that both depend largely on vision and a capacity to recognize and memorize topographical features of the landscape. African aviators have told me that after a few flights on the Cape-to-Cairo route they become very familiar with the country and could find their way across it without the aid of magnetic or planetary guidance. They contend that with a little experience in the air they could fly to a given place in Africa if set down blindfolded in the middle of the Continent, as after a couple of hours of flight, or even sooner, they would be able to locate their position by identifying the physical features of the landscape. They see no reason why birds also should not largely rely upon a capacity to recognize country to guide them on their migrations.

My own experience in the Kalahari Desert has convinced me that topographical knowledge accounts for the Bushman's uncanny faculty for guiding one from place to place in country like the Kalahari, which is composed of an endless succession of flats and undulating grass veld with intervening areas of low scrub and stunted bush of such extraordinary similarity that the unpractised eye cannot distinguish one piece of country from another. The aviators and the birds depend upon recognizing the panorama from the air, and as might be expected of a nomadic people, the bushman, though no doubt possessed of a highly developed sense of direction, is mainly dependent upon the relative positions of familiar terrestrial objects to guide him rather than upon the position of the sun or of the stars. When asked to indicate the direction of some distant and invisible village or physical feature of the country, he will first carefully study the visible landscape with great intentness and then point with astonishing accuracy to within a couple of degrees of the required direction. It is significant in this connection that he practically never looks at the sun except to ascertain the time, and appears quite incapable of steering a course with the aid of the stars. Bushmen are reluctant to travel by night except in country with which they are very familiar, and they usually lose themselves if required to travel by night in regions with which they are unacquainted. They always prefer to hand you over to other guides as soon as they leave their own particular beat. Wherever possible I selected as guides local inhabitants; but when vast areas of uninhabited salt lake or desert had to be traversed, it was necessary to rely on guides with only a very slight knowledge of the country probably acquired from a single journey performed some time previously. To the bushman who accompanied me across the

middle of the lake I explained that I would have no difficulty in keeping him on the correct general course, but I wished him to guide me around sandy, muddy, or heavily wooded areas. He replied that he would endeavour to do so, but that if he appeared to lose his way I should not become impatient with him, because he had only once crossed the lake and the country was flat and featureless, and it would often be necessary to deviate to the right or left to locate landmarks which he could remember having passed before; this was the only way in which he could tell where he was.

On reaching the point where the Nata river crosses the Protectorate–Rhodesian border I followed the course of the river in a south-westerly direction, still passing through mopane forest, and it was evident from the marks on the trees and the rubbish washed up against their trunks that during the rainy season this area is flooded. A headman called Tsigouyane has built himself a comfortable kraal on a raised piece of land which was entirely surrounded by water last year. He complained that during the floods it was difficult to take care of his cattle, and many of them were destroyed by lions. On reaching the junction of the Nata and Maitingwe rivers we found the beds of both streams still dry, but comparatively fresh water was obtainable by sinking holes a couple of feet into the sand. Having fixed the position of the junction of the two rivers we proceeded down the right bank of the Nata through very heavy sand. In our efforts to negotiate this sand we broke the propeller shafts of both lorries and only with greatest difficulty were we able to improvize one serviceable shaft from the two broken ones. We pushed on with the serviceable lorry, and as we moved south pools of very salt brak water with saline deposits round the edges began to appear in the Nata.

During my 1929 expedition, after rounding the north-east corner of the lake, I proceeded in a westerly direction and very shortly after lost sight of the lake. I did not encounter it again until I struck the chain of pans known as Mokoamoto. Proceeding on a course slightly west of south for about 40 miles along a wooded limestone re-entrant I again established contact with the lake and observed that it stretched away in a north-westerly direction as far as the eye could reach. I thereupon turned west along what I conceived to be its northern margin, but in time I lost sight of it and did not see it again until I reached a large pan called Kodiakam, which I thought must be a portion of the lake. Subsequently Mr. Jeffares, of the Walvis Bay Railway Survey, travelled from Rakops to Matetsi (near Victoria Falls) along a straight course and, without having to cross the lake, passed close to a large pan which appeared on the left side of his course. This was identified with the pan Kodiakam, which in 1929 I thought must be part of the Makarikari lake. But although my assumption has been proved to be incorrect, I am of the opinion that the pan Kodiakam cannot be so far from the north-west corner of the main lake of which it is probably a disconnected portion. I should not be surprised if future exploration reveals a number of depressions connecting Kodiakam with the Makarikari on the south-west and Mbabe on the north-west, a view which I believe is supported by Professor Schwarz.

To return to the present expedition, I decided on reaching Madsiara to

explore that portion of the north shore of the lake, its north-east corner and Mokoamoto, and, finding that in these regions there is a big re-entrant into the lake proper, I decided to try and cross the lake along this re-entrant and to discover and locate the point where the natives say the flood-water of the Nata and Botletle rivers join. Skirting round a number of isolated large pans and some pans which appeared to be connected with the main lake and all of which had steep banks from 30 to 50 feet high, we came to a wooded ridge with steep sides, and on descending its southern escarpment arrived at a well which the Bushmen call Thabatskudu. The water in it, though brak, was palatable to human beings and cattle. In endeavouring to cross the pan at the foot of this ridge we sunk to the axles and were stuck for the night, and had the greatest difficulty in extricating the lorry. We fixed our position that night by astronomical observations and pressed forward the next day across a wide grassy plain, which in very wet seasons was no doubt flooded and connected up with the two main sections of the lake. We then traversed another sandy rise, which was followed by a narrow chain of pans along which the natives said the flood waters of the Nata used to flow in rainy seasons. We had now reached the south shore of the lake, and shortly afterwards we struck my 1929 trail at the native kraal of Mekomxana. From this village we proceeded westwards along the south shore of the lake which, after we had been travelling for about 10 miles, took a sharp turn to the north. We followed this new course for about 8 miles along a spur jutting into the lake at the end of which our native guide showed us the place where he said his grandfather used to live, and where in days gone by the flood waters of the Nata and Botletle rivers used to meet. To the north-west, the dry saline bed of the lake stretched beyond the limits of our vision; due east of us a similar dry saline lake floor with occasional grassy islands disappeared in space, while far away towards the north-east the mirage lifted into the sky a few trees which the Bushman assured us marked the south-west edge of the wooded country around Thabatskudu. From the top of the lorry I was able to take a compass bearing of a well-defined channel running in a south-westerly direction, which our aged Bushman guide declared to be the course of the Botletle river, though he explained that nowadays its flood waters seldom penetrated farther east than Mopepi.

Silently we surveyed a scene which was indescribably eerie in its vastness and loneliness. On the shore half a mile away two graceful gemsbok grazed complacently, their long parallel antlers glistening in the noon sun. Otherwise there was no sign of life; neither bird nor breeze interrupted the stillness which seemed to have reigned there for all time. Two days later the whole surface of the lake was churned by the gale into an impenetrable cloud of dust. Although we were unable to motor along the course of the river we established contact with it at frequent intervals *en route* to Rakops, and on the return journey fixed the latitude and longitude of the large and populous village of Mopepi, which, when I visited it in 1929, was enveloped in one of the dust-storms so common in these parts. At Rakops we motored for a day into the vast grassy plains north of that village, and returned along the southern boundary of the lake by the route that I blazed in 1929.

From the south-east corner of the lake however I decided to strike out due east for the railway, but almost immediately encountered dense mopane forest through which we had to force a circuitous passage. About sunset, after a very difficult and trying journey during which we were frequently held up by bush, we came upon signs of habitation, and later detected cattle tracks converging on the inevitable native kraal and well, which we reached at dusk. Here for the first time since leaving the upper reaches of the Nata we were able to obtain fresh instead of brak water. That night I fixed the position of this place, which is called Trusgai and which the natives said had never before been visited by a white man, although it is probably less than 100 miles from rail as the crow flies. Next day we continued on our easterly course without sign of habitation until noon, when I took a midday latitude and learned from some natives we happened to encounter that there was a cattle post on a big river a few miles away in a north-easterly direction, beyond which there was a winding track through the forest to the village known as Sebena, near the Shashi river, through which I had passed in 1929. I accordingly altered course from due east to north-east, and 6 miles farther on came on the river which is called by the natives "Marsupe." We were then guided to a crossing where there was a well sunk in the dry bed of the river, which was about the same size as the Nata and which the natives said carried a considerable volume of water when flood rains fell. It flowed somewhat north of west, and after careful cross-examination of the inhabitants I gathered that it joined the Shuane river before emptying itself into the lake. As I discovered in 1929, the Shuane is the first river encountered going north along the east shore of the lake, and as the only other river on this shore is a much smaller one called the Simonwana, it would appear that the Marsupe could not enter the lake by any other route.

About a quarter of a mile farther on we came to another river which the natives said joined the one we had just crossed and was also called the Marsupe. From this point we followed quite a good native sledge track through the forest, though in some places it was very tortuous and we had frequently to deviate from it, as the trees on either side were too close together to allow the lorry to pass. We crossed three more small streams flowing in a westerly direction, and then a little farther on, two more flowing in a south-easterly direction, but the natives assured us that these last two streams after flowing southwards for a short distance turned westwards and joined the smaller streams we had just crossed. My own view is that the two southerly flowing streams were identical with two of the other three, and that we had crossed a loop in their course.

I had been taking aneroid levels all the way from the south-east corner of the lake and was able to establish that the country was steadily rising until the watershed was reached at a point about 15 miles due west of Sebena at a height of 3700 feet. The location of the watershed could be easily distinguished by the direction of the courses of the dongas and rivulets.

During this day's journey we had a curious and rather unpleasant experience. During one section of heavy sand the lorry boiled over, and we accordingly stopped to let it cool down and to refill it. Immediately swarms of wild bees from a hive near by smelt the water that was boiling over and hurried up

to quench their thirsts. They foolishly settled on the hot radiator to drink the boiling water and, enraged by burnt feet and frustrated thirst, they made things very unpleasant for us until, with a courage that aroused our admiration, Fitter-Mechanic MacIntosh rushed to the wheel and drove rapidly off, waiting for us to rejoin him at a safe distance ahead. The curious thing was that although he crushed two bees by sitting on them, he escaped without being stung. Late that night we reached Sebena, and from there we were able next morning to motor into Francistown along a made road.

THE ORIGIN OF RODDONS

H. GODWIN

The theory of roddon formation

THE continued work of the Fenland Research Committee has recently become increasingly involved with questions concerning some of the ancient river systems of the fens, and it would lead to unnecessary confusion if the results were produced before the published work on the origin of roddons is corrected, and before the views now accepted have been fully explained.

Major G. Fowler has already drawn attention in this *Journal* to the extraordinary interest of the extinct waterways of the Fenland basin,[1] and has published most valuable maps showing the former courses of these waterways.[2] Perhaps the most striking form taken by the extinct fenland waterway is the "roddon," a bank of laminated silt meandering through the peat fens. Major Fowler suggested that the raised form of the roddons was due to differential shrinkage or wastage, as between the silt which had been deposited in their beds when they were active waterways, and the deep peat through which they once flowed. The detailed explanation suggested by Major Fowler, along these lines, appeared in his first paper and was demonstrated by diagrams (Fig. 2). This explanation, though followed by other fenland investigators,[3] I believe to be wrong, and based upon lack of exact measurements of sections across roddons. I propose in this paper to give two examples of measured sections of roddons, and to suggest an alternative mode of origin for them; one which, I am pleased to say, Major Fowler accepts and supports.

The first of these sections was obtained at Plantation Farm, Shippea Hill, near Ely. Here, as over most of the southern part of Fenland, the post-glacial fen deposits consist of three layers: a lower peat bed, a middle bed of soft blue clay, known as "blue buttery clay" or "fen-clay," and an upper peat bed. The roddons are raised banks of silt standing up above the upper peat bed and contrasting strongly with it in colour. Sections and borings through

[1] Fowler, G., "Old river-beds in the Fenlands," *Geogr. J.* 79 (1932) 210–12.

[2] Fowler, G., "The extinct waterways of the Fens," *Geogr. J.* 83 (1934) 30–39. See also "Fenland waterways, past and present," Part I, *Cambs. Antiq. Soc. Comm.*, XXXIII, 1933; Part II, *Cambs. Antiq. Soc. Comm.*, XXXIV, 1934.

[3] Kenny, E. J. A., "A Roman bridge in the Fens," *Geogr. J.* 82 (1933) 434–41.

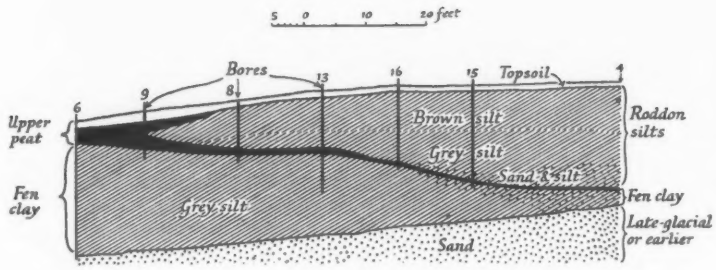


Fig. 1

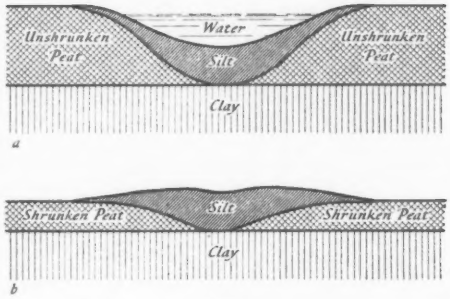


Fig. 2

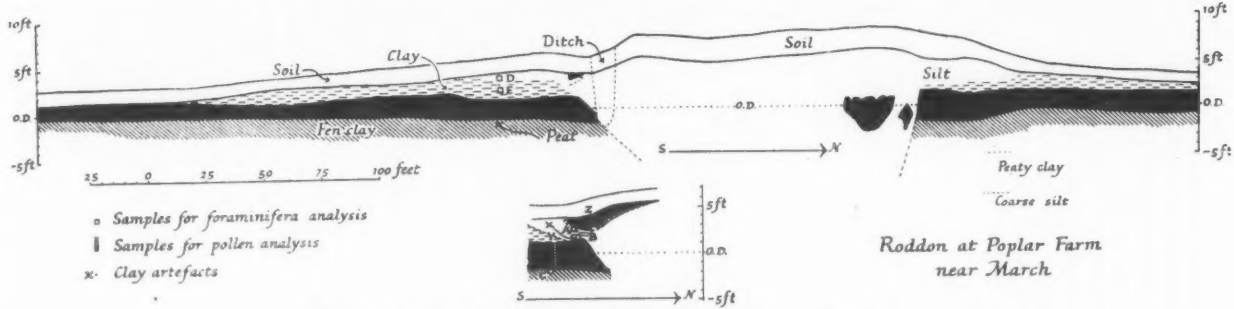


Fig. 3. Section of west face of roddon; inset shows east face

the roddon-silts show that they extend downwards in a channel cut through the upper peat and into the underlying fen-clay, which may or may not have a local silty character.

The roddon investigated at Shippea Hill represents the old course of the Little Ouse, and the section of Fig. 1 is taken from the joint paper in which the Fenland Research Committee's results appeared.[1] The section extends half across the roddon, and given in natural scale, shows the gently sloping surface. It shows clearly how the roddon-silts wedge into the upper peat, part of which extends below the margin of the roddon, and part of which continues over it. Pollen analysis of the peat below the roddon-silts in these places strongly suggested that this corresponds with a level about 12 inches above the base of the upper peat outside the roddon section itself.

Major Fowler's explanation of the mode of origin of roddons can be shown by his diagram (Fig. 2). He assumes the deposition of silt in a concave mass in a bed cut through deep peat (A). By the peat shrinkage which he has himself strikingly demonstrated, this peat is supposed to diminish greatly in thickness. The lowering is supposed to have been proportionately greater under the marginal silts where the peat was thickest, so that the silt which does not itself contract, has subsided into a convex form instead of its original concave one.

Such an origin is unlikely for two primary reasons. Firstly it is based on the notion that the peat shrinks uniformly throughout as a consequence of drainage, *i.e.* that all the original peat substance is still present but compressed. Although some compression may have occurred, the greater part of the lowering of level of the peat-surface certainly follows from lowering of the water-level and aeration of the upper peat, which is converted to volatile products by micro-organisms, and is washed and blown away. As the surface-level falls the drainage-level is lowered and more and more peat disappears. Thus the peat is progressively shaved away from the top, a process for which "wastage" is a better term than "shrinkage." But such wastage will not account for the development of convexity in the roddon-silts, for even now the water-level is hardly as low as the general surface of the fen-clay, and most of the peat below the roddon-silts has not yet been exposed to aeration.

Secondly, the magnitudes involved by the suggested mechanism should be considered. The steepest slope of the roddon is between bores 8 and 13 (Fig. 1) and yet the peat is of similar thickness and similar level at both: a proportionate shrinkage should have shown the peat at 8 much thicker. Moreover for the roddon-silts to have been initially concave the base of the silt in bore 8 must have been at least 4 or 5 feet above its present level, indicating a contraction of the peat to about 20 per cent. of its initial thickness. There is no indication of such great contraction.

It was quite clear that a better section of a roddon would greatly help to elucidate the question, and Major Fowler directed me to a site at Poplar Farm, about 1 mile south-east of March, where a large artificial drain cut through a roddon of considerable size. With the help of Dr. Grahame Clark and Dr. E. J. A. Kenny, this roddon section was surveyed and drawn. It is

[1] Clark, J. D. G., and others, "Report on an early Bronze Age site in the south-eastern Fens," *Antiq. Journal*, XIII, 1933.

shown in Fig. 3. It should be noted that it is drawn from the cleaned western face of the drain, and that the inset represents a portion of the eastern face which shows features less clearly marked on the opposite side. The section only extends a little below summer water-level in the dyke. Although borings were attempted, the sandy nature of the deposits prevented any useful depth being reached with the tools available, but deeper borings were not necessary for our purpose.

The site immediately showed the inadequacy of Major Fowler's theory. The wind-blown faces of the silts in the roddon were clearly laminated in alternate bands of coarser and finer silt. These were almost horizontal and slightly false-bedded, but they showed not the slightest sign of the subsidence required by the theory. They had every appearance of deposition *in situ*. Furthermore it will be noted that the very wide margin extensions of the roddon with sloping surface overlie a peat bed of remarkably uniform thickness and level. If anything, the peat thickens towards the centre of the roddon, so that the peat below the roddon flanks is most unlikely ever to have been many feet thicker than that towards the centre.

Many of the roddons, though not necessarily this one, are known to have been open waterways in historic time, and this roddon proved to show, in unploughed fields close to the section, a central furrow which almost certainly was the last open river-channel. This channel was disturbed on the west face of the section, but was intact on the eastern face. As is shown in the figure, it contained some 3 feet of peat. In many roddons the central channel has been eliminated by cultivation, and it seems likely that in all of them the final residual channel was much smaller than that in the middle stages of the roddon formation.

It seems difficult to escape the conclusion that the roddon-silts were deposited as they now lie, and a good deal of evidence can be brought forward in support of this view. It seems probable that the banked form is the natural levée [1] of a tidal river steadily raised by the depositions of high tides, at frequencies yet undetermined. It is clear that much of the roddon-silt was formed in Romano-British times. It was shown by Kenny[2] that the Roman Causeway at Nordelph, now upon a roddon, led in Roman times by a bridge and a ford over the confluence of a tributary, now also a roddon. Roman ware was found in the lower part of the roddon-silt, and this was true equally of the Little Ouse roddon near Plantation Farm. Even at the Poplar Farm roddon, clay squeezes of the type common in this period were found at the base of the roddon-silts. By lateral tracing on the ground the roddon can, moreover, be shown to run into the enormous roddon which runs from the east towards March, through Rodham Farm and Well Farm, and not only carries the Roman Causeway, but is densely covered near these places with boundary ditches and hearth sites of the same period. It is also abundantly clear that throughout the peat fenland it is the roddon surfaces themselves that are preeminently the sites of a very dense and widespread Romano-British occupation, and there is no lateral break between these occupied roddon surfaces

[1] That is, a naturally formed river embankment raised above the general level of the countryside and produced by flooding in the lower reaches of rivers.

[2] Kenny, *loc. cit.*

and the surface of the silty marshland which also carries signs of a very dense Romano-British occupation.

If, as seems clear, the roddons were favoured occupation sites in Romano-British times, when it is equally clear that they were open water-courses, they must surely already have had their present shape and have stood up as banks above the level of the peaty countryside.

Hochland and Sietland

In a flat region undergoing submergence it is to be expected that clay and silt deposition will follow not only along the shallow open coast but along the estuaries, where in storms and spring-tides, floods will increasingly overflow the channel, depositing in its neighbourhood a strip of ever-increasing thickness of semi-marine material. Thus not only a coastal strip of silt and clay will build up above the general level of the lowland plain, but the same will be true of the wide levées of the rivers. This emerges clearly from a study of the north-west German marshes. As a result of levée formation drainage of the surrounding land is impaired, low lagoon areas form behind the river banks, and here peat formation more or less keeps pace with silt deposition in the levées. This is illustrated in the diagrammatic section by von Bülow,[1] in which (Fig. 4) it will be seen that peat and silt wedge out upon one another beside the estuary, just as they do towards the open sea. When two estuaries traverse such a marsh region, between the raised levées of the two rivers will be an area of topogenous [2] peat formation, which may, under suitable conditions of climate, and land-sea movement, later give rise to raised bog (*Hochmoor*). This condition is shown in the plan of the Jade-Weser marshes (Fig. 5). The strips of marsh beside the estuaries and next the sea contrast clearly with the peat of the country behind them. The reality of the division between the raised silt country and the lower peat land is taken as a matter of course in the north-west German marshes where the two regions are traditionally known as "Hochland" and "Sietland" respectively. The section figured by Schütte [3] (Fig. 6) shows the structure clearly—the Weser channel is on the extreme right, the Jade on the left.

It may be said at once that this difference in level of the two regions is a natural development and is not due to subsequent drainage and wastage of peatland, though, as has been amply shown in the Fenlands, this factor may very greatly amplify the difference. The Hochland and Sietland regions are recognizable both in the English fens and Somerset levels, and a comparable process to that which formed them might be suggested as the origin of the Broads of the Bure valley, which are shallow peat-lined basins cut off from the river channel by the firm banks of the sand and silt of the levée. In the fen district the Hochland, that is the silt country surrounding the Wash, has been shown by air-survey to have been densely occupied and farmed during the Romano-British period, whilst the peat country shows no traces

[1] von Bülow, K., 'Allgemeine Moorgeologie,' Berlin, 1928.

[2] 'Topogenous peat formation is that determined by the accumulation of water draining into a depression, as contrasted with ombrogenous peat formation which takes place under conditions of rainfall and evaporation such that peat formation occurs on flat ground or on slopes independently of any drainage system.

[3] Schütte, H., 'Das Alluvium des Jade-Weser-Gebietes,' Oldenburg, 1935.

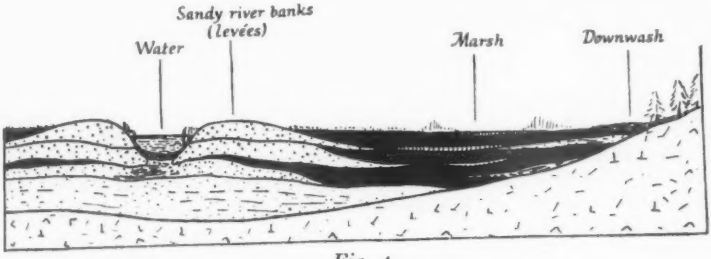


Fig. 4

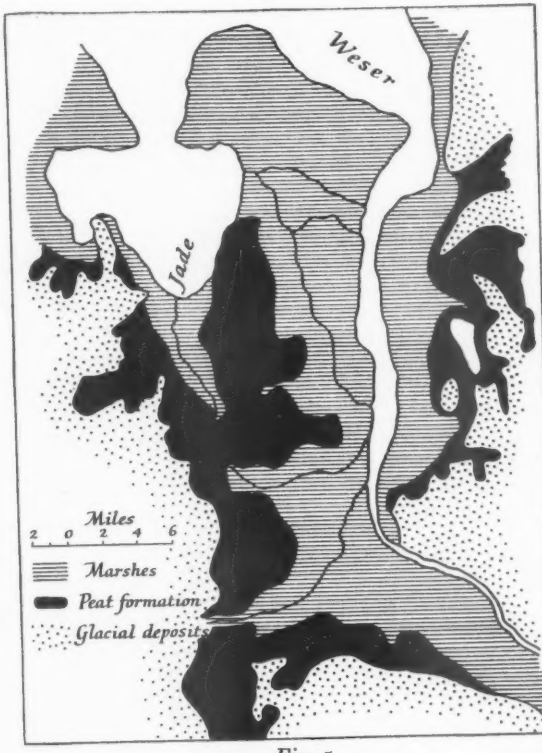


Fig. 5

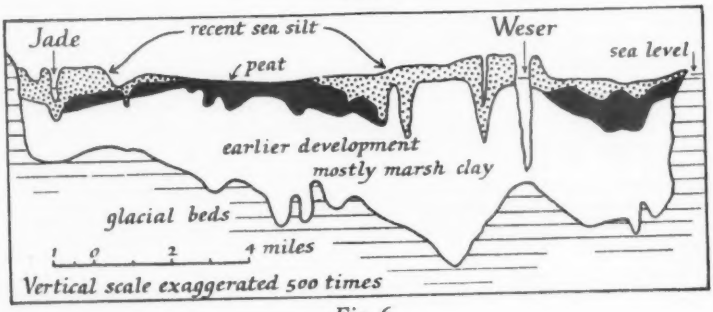


Fig. 6

of such occupation except for the important fact that the levées of the abandoned rivers, now large roddons of silt, show a similar dense settlement.

It now remains to consider the results of detailed studies of the deposits in the two measured roddons under discussion, and the light they throw on fen conditions during and just preceding roddon formation.

Analyses of foraminifera from roddon-silt and fen-clay

Remains of whales and similar large marine animals occasionally reported from the roddon-silts suggest an estuarine origin for them, but the conditions of their deposition are fortunately quite closely determinable by the detailed analyses of foraminifera by Dr. Macfadyen. The results of his analyses at the Little Ouse roddon have already been published with the other results obtained there,[1] and his results at the Poplar Farm roddon are filed as "Fenland Foraminifera Note 13," in the Sedgwick Museum, Cambridge. His results for the Little Ouse may be summarized by the following extracts from his conclusions. Of the fen-clay he says "the water in which these samples were deposited was distinctly brackish," and concludes, "In the whole bed, therefore, there seems to be indicated a transition from semi-marine silty clay to nearly freshwater siltless clay immediately before the deposition of the overlying upper peat." The silts of the roddon "appear to have been deposited from tidal estuarine water flowing up the ancient waterway," and he adds "They are thus of more nearly marine nature than the buttery clay (fen-clay)."

The results from the Poplar Farm samples gave remarkably similar results. Dr. Macfadyen says the fen-clay "shows the usual type of fauna from clays deposited in relatively fresh water." The sample from the top of the roddon-silt was "extremely rich in species of estuarine origin brought in up the channel from the sea."

The other samples of roddon-silt are of the same general character, though varying foraminiferal content, those farthest from the roddon top having fewest of these organisms. Dr. Macfadyen's results here agree with those for the roddon-silts at Rodham farm,[2] which is on the large roddon 2 miles away and with which the Poplar Farm roddon was probably continuous.

It seems clear that at both roddon sites now considered the fen-clay was deposited in brackish water approximating to fresh, and that the roddon-silts were deposited in estuarine waters approximating to marine. Between the two deposits was the formation of the upper peat. Probably this holds over a large part of the fenland when these beds are typically developed.

Pollen-analyses

Despite the general similarity of the sequence of the beds at the two roddon sites now considered, and the proof that they represent the same sequence of conditions of formation, the criticism has been made that stratigraphic continuity has not been established between the two sites, which are separated by a long ridge of fen-islands and by the thick silt deposits of the original

[1] Clark, J. D. G., and others, "Report on an early Bronze Age site in the south-eastern Fens," *Antiq. Journal*, XIII, 1933.

[2] Fowler, G., "Shrinkage of the peat-covered Fenlands," *Geogr. J.* 81 (1933) 149–50.

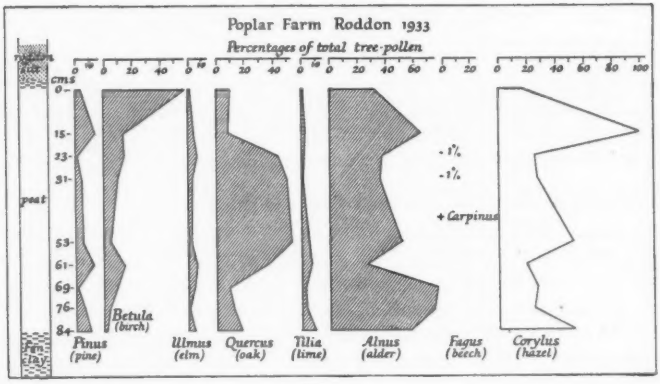


Fig. 7

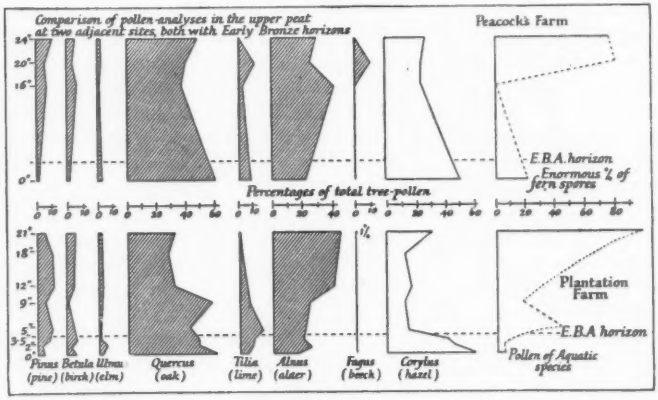


Fig. 8

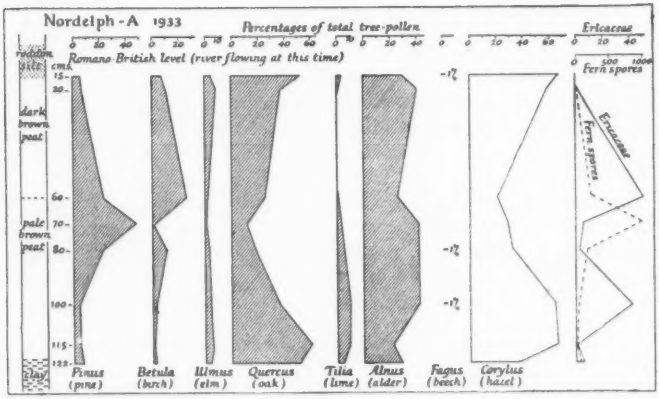


Fig. 9

Ouse estuary, factors which either make for discontinuity of the fen-beds or make boring difficult. Fortunately however the contemporaneity of the upper peat-bed at the two sites can be supported by the methods of pollen-analysis. This method depends on identification of tree-pollens in the successive layers of peat-beds in which they have been preserved since they were first caught in a growing peat surface. The sequence of changes in tree-pollen composition reflects changes in forest history of the countryside and so may be used as a time scale against which geological or archaeological events may be measured.[1]

A series of samples was taken through the upper peat at the Poplar Farm site, at a point (322 feet east on the datum line) close to the position of the old peat-filled roddon channel, but below it and separated from it by undisturbed roddon-silts (see Fig. 3). The results are given in Fig. 7 and may be compared directly with the analyses of the upper peat from the immediate neighbourhood of the Little Ouse roddon at Plantation Farm and Peacock's Farm (Fig. 8), and with analyses of the upper peat between the roddon-silts and the fen-clay at the Roman bridge site at Nordelph (Fig. 9). All these diagrams are to be interpreted in terms of both local and regional factors, of which only the latter are of value for direct correlation with distant sites. Thus the alder which forms local fen-woods has to be discounted as a regional index, and the high birch values at the top of the March series may also be due to local birch woods. Of much more interest is the behaviour of elm, lime, and beech trees which certainly were not growing on the peat fens themselves. It will be noted that all four diagrams show the same feature of high values for lime-pollen just above the fen-clay and then a diminution until these values are equalled or exceeded by those of elm-pollen. This relation has already been shown for several places in the south-eastern fens at the base of the upper peat, and despite the relatively small numbers of grains counted (150 tree-pollens per sample as a rule), it appears to be a constant and important horizon across the fens.[2] Its validity is strengthened by the appearance of small amounts of beech-pollen at equivalent levels in all four sites. The pollen curves of pine do not call for comment; that the sharp rise in the Nordelph diagram is a local effect is shown by the corresponding peak in plants of the heath family. Those of hazel and oak do not correspond well, but this is not uncommon in the fen peats though the complete explanation is not apparent.

The diagrams certainly support contemporaneity of the upper peat in all these roddon sites, and suggest that the sequence fen-clay, upper peat, roddon-silt, is equivalent in dating at both. Thus whatever may have been the underlying causes which produced the roddons, it seems likely that they were all produced at the same time and in the same way.

The last point of interest is the doubt which still concerns the bottom of the roddon channel. In both instances the roddon-silts extend many feet below the level of the upper peat and it is not at all clear how such a deep channel was produced and whether it need necessarily indicate a phase of stream-bed

[1] Godwin, H., "Pollen analysis. An outline of the problems and potentialities of the method," *New Phytologist*, XXXIII, 1934.

[2] Clark, J. D. G., Godwin, H. and M. E., and Clifford, M. H., "Report on recent excavations at Peacocks Farm, Shippea Hill, Cambs.," *Antiq. Journal*, XV, 1935.

erosion following formation of the upper peat. That a swift stream did at one time erode the upper peat is clearly shown in the Poplar Farm roddon where the section shows a very steep edge to the upper peat, and large detached rafts of it in the silt of the channel. Presumably these were peat masses which fell from the undercut banks. The extremely important problem of whether such erosion needs explanation by marine retrogression during or after the peat phase is one that these data hardly suffice to answer.

Summary

It is suggested that the published explanation of the origin of "roddons" is incorrect, although they are clearly extinct waterways in the peat fens. It is suggested instead that they were formed as levées raised above and upon the peat through which the channel flowed. They were formed by deposition of almost marine silt along the banks of rivers and estuaries during the Romano-British period. They keep more or less their original shape, which is not due to peat shrinkage. There is however no doubt that their shape is now becoming increasingly evident through the wastage of the peat which formed over their flanks in the post-Roman period.

Analysis of the foraminifera from the fen-clay and the roddon-silts at the Little Ouse roddon and the Poplar Farm roddon show the former deposit to have been made in brackish water, and the latter in estuarine conditions and in much more nearly marine water. At both sites these two deposits are separated by an upper peat bed.

The results of pollen-analysis strongly suggest the contemporaneity of formation of the upper peat at three roddon sites investigated, and it is highly probable that formation of the roddons was also contemporary in these places.

In conclusion the author would like to express his gratitude to Mr. J. A. Steers and Major G. Fowler, both of whom kindly read through the manuscript; and to Dr. Macfadyen, who allowed him to refer to the results of his foraminiferal analyses, some of which are unpublished. Further thanks are offered to many fen landowners for assistance in field work.

THE OLD ENGLISH MILE AND THE GALLIC LEAGUE[1]

G. B. GRUNDY

IT is sometimes difficult to trace the origin of the measures used by ancient nations in their measurement of distances. The difficulty is greatest when the measure concerned has not been evolved from the shorter measures of distance used by the nation which employs it. Every one who has looked into the measures used in mediaeval England is aware that the modern statute mile of 1760 yards is of comparatively recent origin, and that there existed in England before its introduction a so-called mile which, whatever its actual length, was considerably longer than the mile of the present day. An inquiry which aims at the determination of that length must include an inquiry into the possible origins of the measure concerned.

In the case of the old English mile there are four possible periods at which it may have been introduced into this country: the Celtic; the Romano-British; the Saxon; and the period of the Norman Conquest.

In the earlier stages of economic development, when means of communication over long distances were bad, one of the longer measures of distance was hardly called for. Distances, if they were expressed in any form, were probably expressed in terms of time, a usage quite common with the inhabitants of various European countries at the present day. But, as communications improved, and longer measures of distance became necessary owing to the growth of trade intercourse, units of length longer than those in previous use were evolved.[2]

The linear metric system in its longer units seems to have been, in Western Europe at any rate, formed by multiplication of smaller units. The smaller units were not formed by division of the larger.

At the time of the conquest of Gaul the Romans found in existence among the Celts certain measures of length which appear in Latin as *leuga*, *quarentena*, and *pertica*.[3] The scale was: 40 *perticae* equal 1 *quarentene*, 12 *quarentenae* equal 1 *leuga*.

In ancient times, when underground drainage was practically non-existent, ploughing in ridge and furrow was necessary, the furrows acting as surface drains. The standard unit in ploughland was the amount which a team of oxen or mules could plough in one day, an area which in Saxon England

[1] Seebohm, in 'Customary acres,' pt. II, p. 79, discusses the Gallic league and other ancient measures. He comes to the conclusion that this Gallic league was the origin of the old English mile. This conclusion, though probably correct, was supported by evidence which was defective in quantity. There were also other minor defects in the evidence which deterred many people from accepting his conclusion.

[2] It is curious that the Greeks never evolved for common use any measure longer than the *stade* of about 200 yards, though by the end of the fifth century B.C. they knew the longer measure, the *parasang* of the Persians. For sea voyages they used the time measure of days, accompanied frequently by the distance in *stades;* and in measures of sea distances the Romans, copying probably Greek sailing directions, also used the *stade*.

[3] *Perticata* in a post-Conquest charter of Croyland, Birch, 'Cartularium Saxonicum,' 409; Kemble, 'Codex Diplomaticus,' 233.

was called an *aecer*, in the Latin-speaking world a *jugum*.[1] The *quarentena* was the length of furrow which a plough team could be expected to draw at one stretch. This constituted the length of the *jugum* in West Europe in Roman and post-Roman times. The *jugum* was ploughed in two ridges with specially broad drainage furrows between and on either side of them, and the *pertica* (the origin of the "perch") was the distance from the bottom of the furrow to the top of the neighbouring ridge. These two originally approximate distances were almost certainly evolved independently of one another. The ratio between them, which would tend to be the same in nearly all cases, was standardized later into 40 : 1. It is probable that the *leuga* was a measure of artificial creation derived, not from the *pertica*, as some have thought, but from the more convenient unit of the *quarentena*.

But it is known from mediaeval evidence that the lengths of the *pertica* and *quarentena* varied in different districts in Gaul and Italy, a difference due to variation in the weight of soil, inasmuch as the amount capable of being ploughed in one day and the length of the furrow would be less on heavy than on light soil. Hence the length of the *leuga* varied also in different districts. This raises a question which, though perhaps not soluble, is of importance in relation to later considerations in this paper.

There can be no doubt that the Celts who migrated to Britain from Gaul in the centuries which preceded the Christian Era brought with them the *leugae* of their various homes. Thus, for instance, the *leuga* of the Belgae in Hampshire may not have been the same as that of the Atrebates of the middle Thames basin; and this may have been a contributory cause of the extraordinary variations in the measurements of distance found in the English records of some 1800 years later. But the history of the *leuga* in Gaul does not end at the time of the Gallic migration into Britain. In the period of more than a century and a half between Caesar's conquest of the Three Gauls and the time of Trajan the Roman road system in Gaul was highly developed, and, according to the Roman practice, milestones recording Roman miles, now estimated at 1618 yards, were set up along them. But in Trajan's time the Gallic *leuga* was officially recognized as the standard of measurement in Gaul. Knowledge of Roman methods makes it almost certain that this *leuga* was standardized, and, officially at any rate, took the place of the various local *leugae*.[2] Did the league established in the time of Trajan get in popular parlance the name of *millia*? For a century and a half the Gallic population, owing to the development of the Roman road system in the province, had become accustomed to the term "mile" as the name of the longest official measure. But, though this may have been true in parts of Gaul, the use of the *leuga* in Domesday Book makes it certain that this measure of length was still called by that name in the Normandy of the eleventh century A.D. The question is not answerable, but it implies a possibility which might account for the use of the term "mile" in mediaeval England to describe a distance which was far longer than the Roman mile.

[1] *Cf.* Varro, R.R.I. 10, speaking of Spain: *jugum vocant quod juncti boves uno die exarare possint.*

[2] There is evidence of mediaeval date that the local league remained in use in various districts.

The approximate length of the *leuga* in Gaul is known from statements in late Latin writers who say that it was $1\frac{1}{2}$ Roman miles, which, taken literally, on the basis of a Roman mile of 1618 yards, would be 2427 yards. These statements are doubtless approximate to the truth, though they cannot of course be assumed to be mathematically exact.[1] The Latin authors refer almost certainly to the standardized league of Trajan's time. Did the standardized *leuga* make its way into the province of Britain in the three centuries succeeding its official recognition in Gaul? This question, though unanswerable, suggests a possibility which must be taken into consideration. It seems certain that the Roman mile did not as a measure of length survive the end of the Roman province of Britain. The Roman roads in this country were few as compared with those of the province of Gaul, and the Roman *millia* would be far less commonly used as measures of distance during the time Britain was a Roman province. Moreover the Anglo-Saxon settlers did not import any substitute for it into this country.

Saxon measures

The Saxon system of measures of length derived from the *aecer*. The *aecer* is the amount of land which a team of oxen could plough in one day. In shape it was usually rectangular because ploughing is nearly always done in straight lines.[2] Given an area of land unimpeded by natural obstacles such as streams, or not curtailed by pre-existing ploughlands, the length of the *aecer* was determined by the length of the furrow which a team of oxen could plough without a rest. On light soil it would be longer than on heavy soil, but the general average was 220 yards, *i.e.* 40 poles.[3] The length of the furrow of the *aecer* was known as a *furlang*, "furlong," or "furrow's length." The *furlang* had all but become a definite measure of length in the later days of the Saxon period.[4]

As there was practically no underground drainage for ploughlands, it had to be provided for by ploughing the earth into ridges. The same device was used on the continent, but evolved probably on quite independent experience, and produced consequently closely correspondent measures of length. Each *aecer* was ploughed into two ridges each of which was half the breadth of the

[1] This being so, the *leuga* has been assumed in this paper to have been 2420 yards, or 1 m. 3 fur. according to modern calculation.

[2] The rectangular form of cultivated lands was so customary that exceptions to it received the name of *gara* (gore) which implied a triangular piece of ploughland.

[3] Where owing to some obstacle the *aeceras* or strips of ploughland could not be ploughed to the customary length, such *aeceras* came in post-Saxon times to be called "butts." There is no word specially applied to them in the Saxon charters.

Some of the Tithe Maps of parishes were made before Enclosure Acts were applied to them; and on these maps the old *aeceras* remain, and their length when measured always approximates to 220 yards. But even in present-day maps boundaries of parishes which run in steps indicate that ploughland impinged on the parish boundary at those parts of it; and where the ploughlands impinged sideways on the boundary the lengths of the old *aeceras* can be ascertained by measuring the lengths of the steps.

[4] *E.g.* Birch, *op. cit.*, 892; Kemble, *op. cit.*, 430, a charter of Chievely, Berks: "*north an furlang*" ("one furlong north"); K., *op. cit.*, 584, a charter of Eastcourt in Crudwell, Wilts: "per spatium unius *furlang*."

aecer, *i.e.* half of what would be as nearly as possible 22 yards.[1] Thus each ridge was 11 yards wide, and the distance from the large furrows on each side of the ridge to the summit of the ridge was $5^1/_2$ yards. This distance was the *gierd* of the Saxon charters, the rod, pole, or perch of modern times.

The Saxon cultivator did not need to be impressed with the necessity of drainage. It was wet seasons or wet land which ruined his crops. "Drought never brought dearth to England" was a proverb the mediaeval English knew well. No doubt the ridge and furrow system had been evolved by experience, and had in the course of time become stereotyped on ordinary ploughlands in ordinary situations.

The use of the term "pole" as synonymous with rod and perch suggests that in post-Saxon times a rod of a definite length, *i.e.* $5^1/_2$ yards, was used as a guide to the ploughman. The *gierd* was at times employed by the surveyors of the bounds of grants recorded in Saxon charters when they were dealing with very short distances.[2]

Before the Saxon age ended the furlong was on the way to becoming crystallized or stereotyped into a linear measure with an average length of 220 yards.[3] The term *furlang* was however more commonly used of a group of strips of ploughland without implying any set or approximate superficial measure.[4] No measure longer than the furlong ever appears in genuine charters of the Saxon age. But the surveys attached to the charters did not call for the use of measures of any great length.[5] There is no reason to believe that for large distances the Saxons developed a specific measure of their own by multiplication of the furlong or of the *gyrd*. As has been already said the former was only coming into use as a specific linear measure towards the close of the Saxon age. But it is natural for men to measure long distances in terms of

[1] How very closely this breadth worked out in ploughing may be seen by measuring the breadth of two adjacent ridges on any old grass field which has formerly been ploughed land.

[2] *E.g.* from Kemble, *op. cit.*, 687, a charter of Fovant and Sutton Mandeville, Wilts: "*Thonne be eastan Cester Slaed Byrig XXX gerda*" ("Then 30 rods east of the Chesterblade Camp"). Measured on the 6-inch map the distance from the boundary of the grant to the camp is exactly 200 yards; this would give a *gierd* of 6 yards. But the estimate is no doubt an eye estimate. *Cf.* also Birch, *op. cit.*, 635, "*feovyrtyne gearda beneothan tham pytte*" ("14 rods below the pit"). Also B., *op. cit.*, 206; K., *op. cit.*, 1009: "*east rihte of Ellenbeorge XV girda*" ("due east of the barrow where elders grow").

It is interesting to notice that *aecer* in the expression *aecer brad*, "an acre's breadth," is also used as a measurement. The acre's breadth is that of the two ridges which ran its length, or 22 yards, the chain of modern measurement.

[3] *Cf.* B., *op. cit.*, 795; K., *op. cit.*, 401: "*thonne is hit thaer feower furlanga brad butan feower gyrdan*" ("then is it at that part four furlongs save four rods broad"); B., *op. cit.*, 892; K., *op. cit.*, 420: "*thonne thaer north an furlang*" ("then at that point north for one furlong") B., *op. cit.*, 1338: "*thonne is thaes ymbganges ealles threo furlang and threo met gerde*" ("then the circuit of the whole is three furlongs and three proper (?) (or linear ?) rods").

[4] *E.g.* B., *op. cit.*, 734; K., *op. cit.*, 1120: "*Furlanges west heafde*" ("the west headland of the furlong"), and numerous other examples in the charters. The use of the term "furlong" in this sense survives in numerous field names.

[5] In charters of Croyland Abbey, B., *op. cit.*, 353, 409; K., *op. cit.*, 221, 233, professedly of pre-Conquest but certainly of post-Conquest date, the *leuga*, *quarantine*, and *pertica* are cited as measures.

some more or less definite measure, and there can be no reasonable doubt that they employed the Gallic *leuga* which had been in use in Britain some centuries before they settled in the land.

The question with which this paper is concerned is whether the Gallic league continued to be in use in this country after the date of the Conquest, and, if so, in what form and for how long.

Seebohm [1] maintained that the old English mile was the Gallic league: (1) from the distance between certain old milestones in Yorkshire showing a mile of 2424 yards which is practically $1\frac{1}{2}$ times a Roman mile of 1618 yards, *i.e.* a Gallic *leuga:* (2) from the 'Husbandry' of Walter of Henley from which he cites a definite statement that a league is 12 furlongs.

In the *Journal* for October 1930 Sir Charles Close deduces from eight examples of distances recorded in the ancient map of A.D. 1300 or thereabouts (in the Bodleian Library) that they afford evidence of a mile averaging 1·27 of the statute mile of 1760 yards, *i.e.* a mile of 2335 yards. Gough made and published a copy of this map. He gives twelve examples of distances other than those quoted by Sir Charles Close, of which three are obviously wrong or very doubtful. The remaining nine vary enormously from 1716 to 3760 yards, the average being 2358 yards. It is quite evident that the compiler of the map took his distances for the most part from popular report and not from personal experience. Measurement of distances on an old map by means of any scale attached to it would be utterly untrustworthy, and even when, as in this map of 1300, the actual figures are inserted on certain routes they vary so greatly in respect to the length of the mile that any reliable conclusion to be drawn would have to be drawn from a much larger number of instances than this map affords. For the above reasons data from old maps have been ignored in this paper.

In another paper in the *Journal* for April 1931 Colonel Karslake points out that in Higden's 'Polychronicon' of 1344 the old mileage from Dover to Canterbury is given as 12, and that in 1633, when the distance was measured in miles of 1760 yards for postal purposes, it amounted to $15\frac{1}{4}$ miles, giving a length of 2420 yards for the mile of Higden's time. For reasons which will be given later it is fairly certain that Colonel Karslake is correct in his estimate of the length of the old English mile; but the fact that he deduces it from one instance would not carry conviction to any one who knows the itineraries and ancient maps. He may regard this as a crucial instance; but, again, this would be unconvincing because no single measurement taken from the old maps or itineraries can be demonstrated to be a crucial instance.[2]

The Itinerary of Leland

Use of the Itinerary of Leland has to be made with circumspection, partly because he does not always indicate clearly the places between which the mileage given holds good, and partly because he does not give more than a very few accidental clues as to whether he is stating a distance from personal experience or on information obtained from others.

[1] 'Customary acres,' pp. 79 ff.

[2] Higden's statements of distances are few and far between. The question does not seem to have interested him. He gives the distance from York to Aldborough as 15 miles, which happens to be the distance measured in miles of 1760 yards.

Any valuation of such information must take into account the circumscribed nature of the lives of those who lived at the time at which he wrote. Most of the roads were unmade tracks, patched roughly in peculiarly bad places, in many cases untraversable in bad seasons, and rugged with deep ruts in dry weather. The vast majority of the population could rarely afford time for any journey of more than a few miles in length. Hence when it came to a statement of distances of even more than 4 miles the information given to an inquirer might be vague and for any distance over 10 miles very uncertain indeed. The tendency of men in general is to underestimate distances of which they have personal knowledge, and to exaggerate those which extend into regions unknown or little known to them. Again the short distances of under 4 miles in Leland are probably for the most part stated from his own experience, and those of greater length are in most cases the result of inquiry. Needless to say the former are more likely to be trustworthy.[1] This is supported by the data in the tables which follow.

TABLE A: AVERAGES

Leland's Miles	*No. of Instances*	*Total in Yards*	*Average in Yards*
1–4	235	587,319	2499
5–9	192	429,595	2237
10–19	114	251,896	2210
20 upwards	35	73,032	2087
Total	576	1,341,842	2329

TABLE B: INSTANCES OF AVERAGE YARDS PER MILE DIVIDED AMONG HUNDREDS[2]

Hundreds of yards	*Instances*	*Hundreds of yards*	*Instances*
13	10	26	45
14	7	27	15
15	4	28	15
16	6	29	14
17	33	30	18
18	15	31	4
19	47	32	7
20	40	33	7
21	31	34	1
22	60	35	6
23	48	36	1
24	54	37	2
25	18	38	4
—	—	39	2

Table A illustrates the tendency of human nature in estimating distances. It will be seen that the mile in Leland becomes apparently shorter as the distance increases, and also that in distances up to 4 "Leland" miles there is, assuming the old mile to have been 2420 yards, a tendency to under-estimate the "Leland" mileage, though not to any great extent.[3]

[1] The total number of instances taken from Leland is 576.

[2] *I.e.* there are ten instances of miles varying from 1300 to 1399 yards, etc.

[3] Some of the individual instances of mileage in this 1–4-mile series, though in the vast majority of instances the series seems generally to hover round the figure 2420

Another test of the figures may be made by taking the number of instances in which the number of yards in the "Leland" mile falls within 50 yards of 2420 yards. They are: 1–4 m., 21; 5–9 m., 26; 10–19 m., 12; 20 m. upward, 7. The number of instances in which miles of exactly 2420 yards occur in the different series are:

Miles	*Instances*	*Percentages of Instances of the series*
1–4	18	7·7
5–9	4	2·1
10–19	4	3·5
20 upwards	1	2·8 [1]

This last table shows that where the figures in Leland are likely to be nearest to the truth, viz. in the short distances, the number 2420 yards occurs as frequently as in all the cases of longer distances put together.

The total average (see Table A) of 2329 yards is what might be expected from the fact that off-hand calculations of long distances are apt to be exaggerated, so that the "Leland" miles given for these distances would be in many instances larger in number than they should be, and the apparent length of the mile would consequently be shorter.

There is only one feature of Table B to which attention must be called. The largest number of instances centre in 1900–2499 yards, which is about what might be expected were the actual mile 2420 yards, for the exaggeration of distance, and consequent diminution in the apparent length of the mile occurs in the groups 5–9, 10–19, and 20 m. upwards, in which there are 341 available instances as against 235 in the 1–4 m. series (see Table A).

Leland's distances do not prove anything with regard to the length of the old mile, because they are far from being mathematically correct. They could not be expected to be so, taking into consideration the time at which, and the circumstances under which, they were made. But they strongly suggest a measure of 2420 yards for the old English mile, a measure which is supported by evidence from elsewhere.

It has been suggested that miles of different lengths prevailed in different parts of mediaeval England. If by that is meant different miles of set lengths the theory does not get any support from Leland's figures. But those figures show that all down the west border there was a tendency to reckon the miles at a shorter length than they were usually reckoned in the rest of England. In Cheshire, Shropshire, Worcestershire, Gloucestershire, Somerset, Devon, and Cornwall the average mile in Leland does not touch 2300 yards.[2] But there is nothing that can be called evidence of any set measure of length less than 2420 yards. In south Gloucestershire and north Somerset, on either

yards, tend either to greatly exceed or greatly to fall short of that number. Those which imply a mile of 4000 yards or over I have omitted from the calculations as being almost certainly mistakes made by Leland or his informants, or in the copying of his text.

[1] It must be borne in mind that the variety of the lengths of miles as calculated from Leland's data is very large indeed. Taken however in conjunction with the known tendencies of human nature in the calculation of distances the figures in this list are very significant.

[2] In Herefordshire, curiously enough the average length is 2600 yards.

side of the lower Avon between Bath and Bristol, is a region where the average length of the Leland mile is even less.

It might be expected that on turning to Ogilby's road-book of 1675 evidence of a more or less precise character would be found; but that is not the case. Ogilby set himself to measure the distances on the various routes in terms of the Elizabethan mile of 1760 yards. It is evident that in the previous eighty years the use of this mile had been adopted as a measure the definiteness of which was very preferable to the indefiniteness of the computed mile. Otherwise it is hardly likely that Ogilby would have adopted it. But side by side with the distance stated in terms of the new mile he gives the distance stated in terms of what he calls computed miles, which are evidently the old English miles used by Leland.[1]

A comparison of these few stated distances which correspond in the two authors shows instances both of correspondence and difference in the measurement. No doubt this is partly due to inaccurate information as to distances given to one or the other of them, and partly due to the difference between the circumstances under which they respectively made their own estimates. In Ogilby's work the computed mile plays a comparatively unimportant part. His interest was in actual measurements in terms of the mile of 1760 yards. He did not worry himself about much exactness in respect to distances in the computed mile. Leland sometimes gives fractions of a mile, or says that a distance is between this and that number of miles, or is so many long or short miles. Ogilby gives his computed figures in integral figures, and in no other form.[2]

Moreover Leland deals far more largely with distances of 4 miles and under,[3] distances in which errors of computation would be fewer in number than in the case of longer distances. Ogilby was taking the stages along roads, the lengths of the stages being determined either by changes in the direction of the route, changes in the nature of the road,[4] or the passing of the route through some noteworthy town or village. These stages tended, not unnaturally, to be longer than 4 miles. But his figures, when worked out in yards, present the same phenomenon as those of Leland: in distances of over 4 miles a great drop in the length of the computed mile as compared with its length when calculated from distances of 4 miles and under. These figures are given in the following table.

[1] Leland and Ogilby give in 31 instances their respective computations of mileage over identical stretches of road. In 14 instances they agree; in 17 they differ.

[2] He gives 142 instances of road stages of between 10 and 19 miles. Of those no less than 68 are estimated at 10 computed miles.

[3] Of the 576 distances taken from Leland 235, or 40–41 per cent., are of 4 miles or under. Of the distances taken from Ogilby only 87, or 16 per cent., are of that distance.

[4] It must be remembered that Ogilby was not traversing main roads, *i.e.* roads of uniform character connecting important centres of population. The through routes of those days were, when not ridgeways or Roman roads, made up of local parish roads, formed originally for the purposes of the local village community, but naturally meeting on the parish boundaries the roads of neighbouring communities. They were links in a chain of communication, and were naturally of very varying quality, and mostly bad.

TABLE C: YARDS TO THE MILE IN LELAND AND OGILBY

	No. of instances		*Yards to the mile*	
Old miles	*Leland*	*Ogilby*	*Leland*	*Ogilby*
1–4 m.	235	87	2499	2470
5–9 m.	192	317	2237	2131
10–19 m.	114	142	2210	2166

The informants of both of them tended to understate slightly distances that they knew well, and to overstate considerably distances of which they had either little or no personal knowledge.

Neither from Leland nor from Ogilby is it possible to get exact mathematical data. Taking this factor into consideration, it appears from the data obtainable from Leland and Ogilby that the ordinary dwellers in England in their respective times were calculating distances on a mile which was descended ultimately from the Gallic league, introduced into this country by the Celts who came from Gaul nearly two thousand years before the times of Leland and Ogilby. After the time of Ogilby the modern mile came into use in the calculations of distances on the turnpike roads of the eighteenth century, a use promoted in all probability by the work of Ogilby. It did not become a statutable measure until as late as 1824.

How the distance originally called *leuga* came to be called a mile in England there is no evidence to show. As has been already said the Anglo-Saxons seem to have come to this country without having evolved any measurement covering so long a distance. But the Germans beyond the Rhine in the brief period during which they were under Roman rule and during later centuries of intercourse with the Roman Empire came to know the Roman mile as a name, and, before the Western Empire fell, had introduced the Latin term in a germanized form into their own language, though there is no evidence that they made practical use of the measure. The Teutonic invaders of Britain, finding in this country the *leuga*, a measure of length much longer than any they had employed in their original home, may have given it a name which they had associated with the longest measure of length, of which they had at any rate second-hand knowledge.

Plot in his 'History of Oxfordshire,' published in 1677, *i.e.* within two years of Ogilby's work, has a noteworthy passage in his preface. "As for the scale of miles, there being three sorts in Oxfordshire, the greater, the lesser, and the middle mile, as almost everywhere else, it is contrived according to the middle sort of these, for this I conceive may be called most properly the Oxfordshire mile" . . . "I have found it to contain for the most part $9\frac{1}{4}$ furlongs" (which would be 2035 yards).

The greater mile was evidently the old English mile of Leland and Ogilby, and the lesser was no doubt the Elizabethan mile of 1760 yards. It is impossible to say what the middle mile was. Plot implies that it was in actual use a variable distance. It may have been a form of the mile of 2420 yards, a distance which had gradually diminished in the popular usage of centuries.[1]

[1] I have not been able to find any reference to it elsewhere, and Plot does not cite distances which can be measured on the modern map.

THE ORIGIN OF THE NAME ANTILLIA

G. R. CRONE

THE island of Antillia which appears upon charts of the fifteenth century has been the subject of much speculation and interest to writers upon the history of exploration. The island is generally shown in rectangular form in the western sea, approximately in the latitude of Lisbon. Some writers have deduced from its position that it represents a "pre-Columbian" knowledge of the American continent. The meaning and derivation of the word have also given rise to conjecture, and various far-fetched explanations have been advanced. A. von Humboldt concluded that it was derived from the Arabic *Al-Tin*, and meant "the island of sea-dragons."[1] Another explanation, favoured by Kretschmer,[2] is that it was formed from the Portuguese words "ante ilha," meaning apparently the "nearer island" or "an island lying off the coast of a larger." From assumptions such as these it is of course possible to build up attractive hypotheses regarding the significance of the island in the history of discovery. A consideration of the available cartographic evidence and of contemporary geographical ideas however shows that these theories have been based upon a misconception.

The fundamental evidence is afforded by a legend which appears on the chart of Franciscus Pizigano of 1367, now in the Biblioteca Nazionale at Parma. The inscription is difficult to read, but those who have studied the map are in agreement on the main points. The following translation is based upon Kretschmer's reading, made after a personal inspection. The inscription is written in six lines, parallel with the left-hand edge of the chart. "Here are statues which stand before the shores of Atullia (*ante ripas Atulliae*) and which have been set up for the safety of sailors; for beyond is the vile sea, which sailors cannot navigate." As Kretschmer thought he could detect an abbreviation mark over the A, he considered that a better reading would be "Antullia."

It should be noted that there is no definite mention of an island in the inscription, nor is an island drawn upon the map. The circular medallion below it has no significance in this connection; it is merely one of several arranged systematically around the border of the chart.

The word "Atullia," either in this or a similar form, is not found again until some sixty years later.[3] On the chart of Battista Beccario dated 1435 appears an oblong island, approximately in the position of the inscription on the Pizigano chart, and on this is written the word "Antillia." Above is another island of similar design labelled "Satanaxio" (?), and two other small islands, Royllo and Tanmar, are also shown. Close by is written "Insule de novo r'pte" (reperte). This is the first time the name appears in the form that became stereotyped, and also the first time that it is associated with

[1] Humbolt, A. von: 'Études critiques,' 1837, vol. 2, p. 211.

[2] Kretschmer, K.: 'Die Entdeckung Amerika's 1892,' p. 209.

[3] The island and the name appear on an anonymous chart at Weimar, to which the date 1424 is sometimes assigned. As the date is doubtful, and the chart resembles that of Beccario, I have not referred to it in the text.

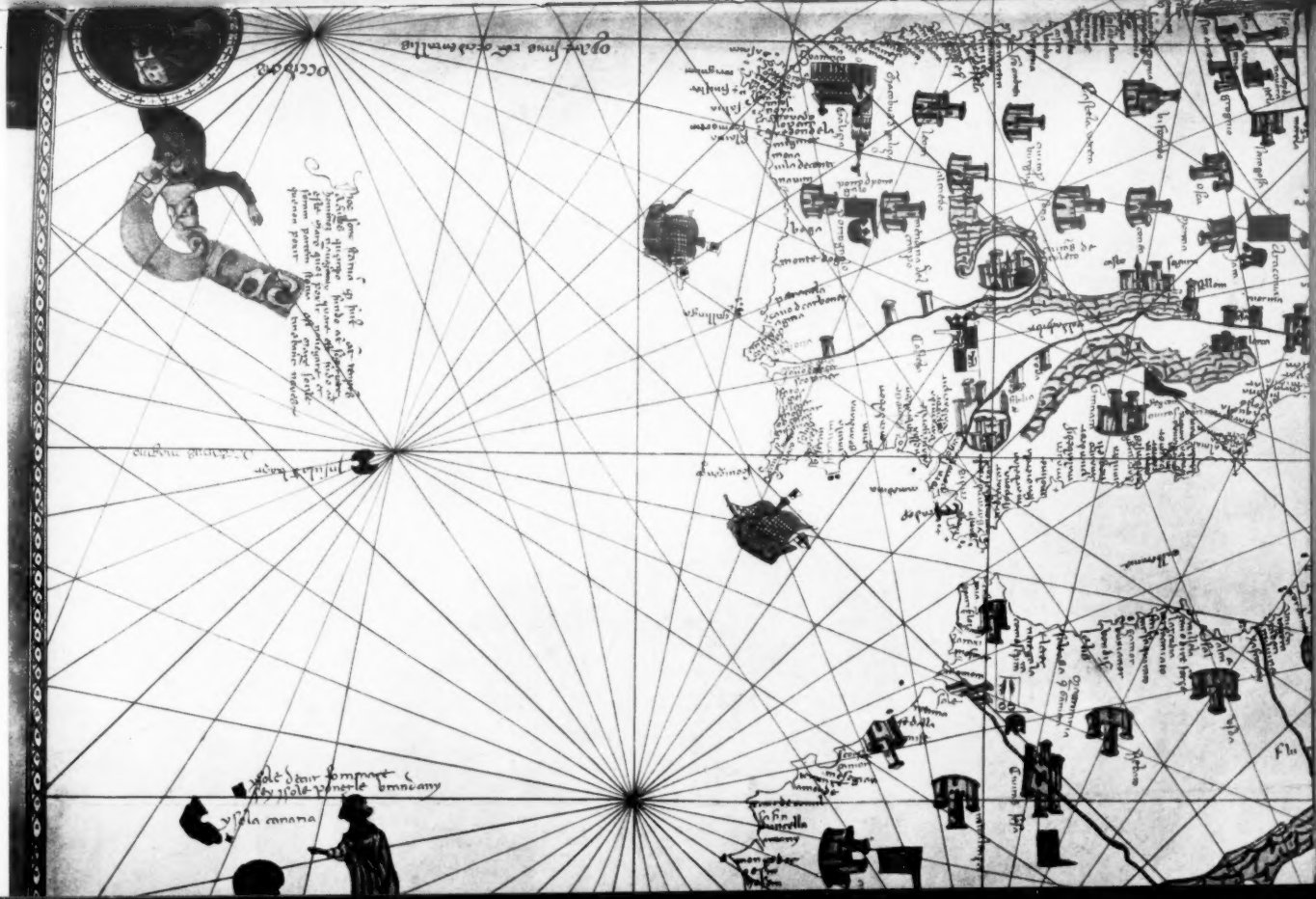


Chart of Franciscus Pizigano, 1367

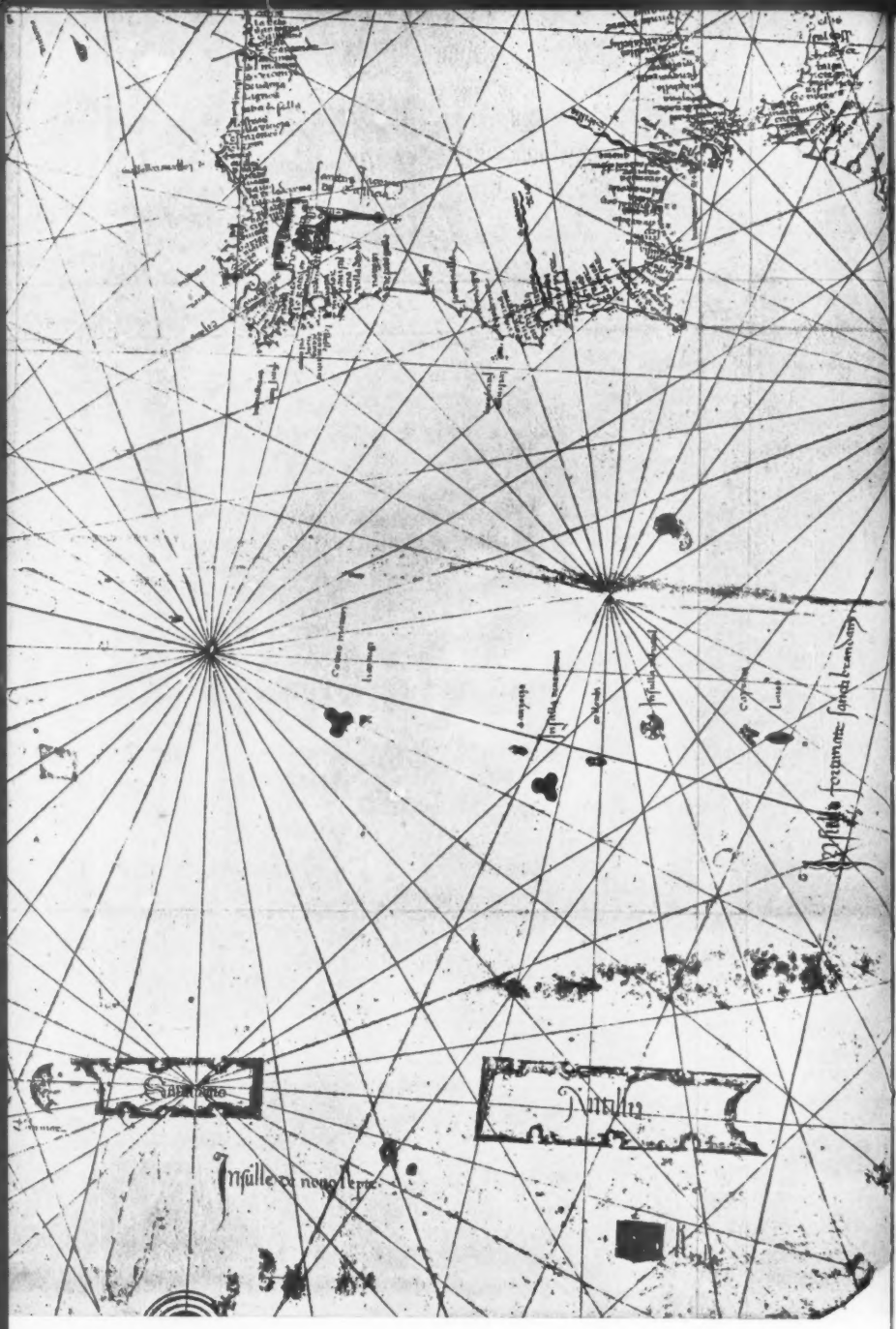


Chart of Battista Beccario, c.1535

the conventional outline of an island. It is probable however that it had occurred on earlier charts now lost, for in the following year it figures, as "Ya de antillia" on a chart by Andrea Bianco, and there is no reason to suppose that Bianco was copying direct from Beccario. Later in the century it is frequently found on charts, *e.g.* on one by Benincasa dated 1482, with six other obviously fictitious names, all beginning with A, it having been amalgamated with the legend of the Seven Cities.

If the name Antillia is disregarded for the moment, and the remainder of the Pizigano inscription is examined, it is at once apparent that it merely repeats a legend common to mediaeval cosmographies. This was to the effect that Hercules had set up two columns at the western limit of his explorations, and it gradually came to be thought that these marked the limits of possible navigation in the west. These columns were considered to have been set up on the island of Gades in Spain. In the *Imago Mundi* of Pierre d'Ailly there are several passages regarding their position; he refers to "certain monuments on some islands, which were there as signs to indicate that there were no habitations beyond; these monuments were near the passage of Hercules (*i.e.* the strait of Gibraltar), to whom they were attributed; that is why they were called Gades or columns of Hercules" (Buron's edition, vol. 2, p. 443).

The identity of the columns of Hercules with the land on each side of the strait of Gibraltar is expressly noted by Fra Mauro on his world map of 1459. It is also noteworthy that on this map there is an inscription on the west coast of Africa, at the approximate limit of contemporary voyaging, to the effect that the cartographer had often heard that there was a statue here "with a hand" (?) which set forth in writing that it was not possible to advance beyond this point.

It is permissible therefore to assume that the inscription on the Pizigano chart referred originally to the straits of Gibraltar, and that a solution of the phrase "ante ripas Atulliae" is to be sought for in that region. This solution is not far to seek. The classical name, which also occurs in mediaeval literature and on Fra Mauro's map, for the western region of Mediterranean Africa is Getulia. If the phrase is emended to "ante ripas Getuliae" this is a precise description of the position, according to mediaeval ideas, of the islands upon which the warning columns stood. The ornamental capital G might easily be mistaken for a capital A by a careless scribe. It may therefore be concluded that the "Atullia" of the Pizigano chart is a copyist's error for Getulia, and that later copyists, no doubt making an error similar to that of Kretschmer, read the word as Antillia.

The oblong shape of the "island" strongly suggests that the outline may have been derived from a border around an inscription similar to that on the Pizigano chart. Its position in the western ocean is to be attributed to the fact that it originally referred to the straits of Gibraltar, but that when that point, with the expansion of the known world, could no longer be regarded as the limit of navigation, it was moved westwards along the same parallel. Fra Mauro, being more interested in the voyages to the south, moved the inscription in that direction.

Another example of the way in which the islands upon which the Pillars of Hercules were said to stand were moved from their original position near

Beccario, 1435

the Strait of Gibraltar was pointed out by Mr. C. E. Nowell in the *Journal* for May 1937, p. 485. On the chart of Mecia de Viladestes of 1413, they were moved down the north-western coast of Africa, where, under the name of "Dos ermanes," they were retained by Bianco in his chart of 1448. The moving of the islands in this direction may however be due to Arabic influence. Idrisi, substituting Alexander the Great for Hercules, seems to have placed the "idol" in one of the Canary Islands.[1]

The period when the island Antillia appears on the charts, *i.e.* during the first third of the fifteenth century, preceded somewhat the discovery of the Azores, and it is to this that the phrase "insule de novo r'pte" refers.[2] It was natural to associate the newly discovered islands with the pre-existing fictitious Antillia.

So far therefore from the name having an origin which, if ascertained, would throw light upon the circumstances of the discovery of the island, Antillia was derived by a series of blunders from Getulia. Examples of such ignorant transformation of names by fifteenth-century cartographers are numerous. The Italian name for an island in the Canary group was "Vecchi marini," that is, island of seals. This became transformed into "Vegimar" and "Bezimarin" by chartmakers of other nationalities. The application of Antillia to an island, and the delineation of that island, were also the result of misunderstanding. It is thus pointless to seek to identify it from its approximate position in the Atlantic, and the wild surmises, *e.g.* of Babcock,[3] who concluded that it represented a discovery of Cuba before 1435, or of Nordenskiöld,[4] who attributed it to "some vessel being storm driven across the Atlantic," may be dismissed, as may the conjectures already mentioned as to its meaning. The Portuguese sailors who later voyaged in search of Antillia were seeking, under a fictitious name, for land which had already been discovered.

Humboldt was led astray by reasoning from the name alone, for he was apparently not aware of the remainder of the Pizigano inscription. The history of the origin of the "island of Antillia" emphasizes once again the necessity of taking into consideration the whole cosmographical outlook of the age when discussing isolated problems.

To illustrate this paper, a portion of the Pizigano chart is reproduced from the hand-drawn facsimile in Jomard's 'Atlas des monuments de la géographie,' and part of the Beccario chart from the photograph in 'Studi bibliografici e biografici sulla storia della geografia in Italia,' Rome, 1875.

[1] Dozy's edition of Idrisi, p. 28. Idrisi calls the islands Al-Masfahān and Laghous.

[2] It has been asserted that certain islands on fourteenth-century charts reflect a knowledge of the Azores. Dr. Hennig ('Terrae incognitae,' vol. 3, p. 245) gives reasons for rejecting this. In this case, the phase quoted above refers to their rediscovery by the Portuguese.

[3] Babcock, W. H.: 'Legendary islands of the Atlantic, 1922,' chapter X.

[4] Nordenskiöld, A. E.: 'Periplus, 1897,' p. 177.

LOPO HOMEM AND THE MILLER ATLAS OF 1519

Note: We have received from Professor G. Caraci a reply to the article "Lopo Homem's Atlas of 1519," by M. Destombes, published in the *Journal* for November 1937. This was submitted in proof to M. Destombes, whose comments follow Professor Caraci's note. The two notes have been translated.

THE arguments advanced by M. Destombes to prove that the map of Lopo Homem, dated 1519 (here referred to as L), and considered by me to be a clumsy forgery, forms the first leaf of the Atlas (Rés. Ge. DD.683) in the Bibliothèque Nationale, Paris (here referred to as P.), can be reduced in substance to extrinsic and formal comparisons which do not affect the contents of the two documents, although they may appear convincing at first sight. I reserve for examination elsewhere, and at greater length, the questions which M. Destombes' suggestion raises and which he leaves to one side. I limit myself to putting forward some preliminary objections which, in my opinion, must lead us to reject his suggestion. The reconstruction that M. Destombes makes from P and L begins with the supposition that P is designed "to cover the Portuguese field of activity." Is this correct? On L we read "hec est universi orbis ad hanc usque diem cogniti tabula," an expression corresponding to what Gastaldi called "universale," that is, a representation of the then known world. Apart from the fact that in L the word "tabula" is used, and that "tabula" has never signified "atlas," it is easy to satisfy oneself that if L cannot strictly be defined as a "mappamondo," neither does P present the configuration "universi orbis ad hanc usque diem cogniti." M. Destombes is obliged to suppose that P should be completed by missing leaves, but none of the manuscript atlases of this and the following century known to me present so unharmonious an arrangement. In P there is no leaf which resembles another in the position assigned to the drawings. To put the atlas together it was not possible to paste the *versos* of the present parchment leaves together, nor of the leaves which M. Destombes supposes to be missing. He is also obliged to assume that the large chart of the Atlantic, known as Miller I (Bibl. Nat., Rés. Ge. HA.640), and here referred to as M, must form part of P. If this were not the case, one could not legitimately speak of an atlas covering the Portuguese field of activity (it would lack anything referring to the north-east extremity of the Novo Mondo), nor of an atlas of the known world. M. Destombes does not mention two circumstances: not only are the dimensions of M altogether different and much larger (1·16 m.×0·57 m.) than those of P (0·57 m.×0·41)—so that to bring it to the form of the latter it must be folded four times—but it has on the verso the drawing of a so-called "normal portolan" which, according to Denucé, must be "of greater age, and is discoloured by use" ('Cartographie portugaise,' p. 45). It is thus evident that M cannot have formed part of P, for one cannot argue that Lopo, in an atlas commissioned by the King, would have had recourse to an already used parchment. Further, there is no motive for uniting L with M. Assuming, without accepting, that "tabula" signifies "atlas," L presupposes this to be complete, though this is not the case with M.

The large scroll at the top, almost in the centre, was designed to contain an inscription (? the title), which was never inserted. Is M contemporaneous with P? Although not yet proved, this appears very probable. It is certain at any rate that M and P are by the same hand. There is no doubt that M could not be inserted in P. To sew or paste it along the fold it now has, would be to sacrifice one of the two maps drawn on it. I therefore conclude that P and M together cannot be referred to one atlas, as Denucé believed.[1] In any case, removing M from P, the latter remains so defective that it is not apparent how it can be united with L, if L is to be considered its first leaf. It is necessary to suppose that the greater part of P must have been lost, an hypothesis as likely as its opposite. That does not negative the possibility that L may be united with P, but all the tentative reconstruction by Destombes must be remade.

Without doubt, the outline of L presents analogies with that of P, but these may very well be pointed out without disposing of the assertion that L may be a forgery. It may be that the forger had P before him, which, it cannot be denied, was acquired by a public library only in 1897. The analogies besides reduce themselves to purely extrinsic elements: the calligraphy, which apart from some letters and abbreviations, is obviously different, the ink, and particularly the drawing of a small feather after some of the legends. As to the similarity of the outlines, I consider that Destombes exaggerates this. Thus, for example, the outlines of the Baltic and Scandinavia are not altogether peculiar to L, where there is finally some difference from P, but are to be found also in the atlases of Vesconte Maggiolo, one of which, dated 1548, was recently found and described by me (*Universo*, 7 (1926) 749).

A discussion of the documentary content of P would be more conclusive, but Destombes has put this to one side. For my part, I confine myself to stating that M and P together cannot be anterior to 1521—and, perhaps even some years later, as Harrisse had already shown ('Découverte de la Terre-Neuve,' 1908, p. 86). This point cannot be proved in a few lines, but it is important to note that P does not lend any support to the strange anachronistic representation in L of an interior ocean closed between the old and new worlds by a hypothetical southern continent. In P, the eastern coast of the Sinus Magnus ends at about 22°5. M. Destombes seeks to explain the presence of the arms of Catherine de Medici on L by a hypothesis which cannot but appear singular—if the French Government was obliged to seek in L for support for colonizing "le troisième monde," that is, to appeal, between 1559 and 1583, to a cartographic document half a century old, which has no place-names, we must form a modest opinion of the ability of that government. He also cites Schöner and Piri Reis among those who believed in the existence of a southern continent. Actually Schöner never drew, as far as is known, anything of the kind; in his 'Luculentissima descriptio,' Nuremburg, 1515, he wrote "quarta orbis pars est insula, quia omnique mari circumdata conspicitur." As for Piri Reis, the little that remains of his world map does not

[1] A. Cortesão ('Cartografia e cartógrafos portugueses,' I, p. 281) says that the present order of the maps in P is not the same as that noted by Santarem. One may also observe that M., from its contents, is the map best suited for subdividing for inclusion in an atlas.

suggest that he believed in it. The whole Portuguese tradition from Canerio to the Reinels, from Waldseemüller to Peter Apian, is opposed to the distortion seen in L. That an official cartographer such as Lopo could, in the very year of the departure of Magellan's expedition, draw in an atlas designed for the King the coasts of the Magnus Sinus as completely closed towards the east, so as to render impossible all maritime communication on that side with the New World, is a consideration which should be excluded *a priori*. Although not able to agree with M. Destombes' hypothesis, I note that his short article raises a discussion as to the paternity of P—A. Magnaghi has already questioned the attribution to the Reinels ('Planisfero del 1523,' p. 63)—and some doubts about the date of the large Florence map of Lopo Homem. Both arguments, in the light of his observations, require further examination.

GIUSEPPE CARACI.

When I wrote the article "Lopo Homem's Atlas of 1519," after having myself seen the two originals in question (P–M and L), I had not had the opportunity of seeing the two documents together. The map of Lopo Homem being now at Paris I am able to confirm the statements contained in my article. The large map of the Atlantic (M) is the only one studied by Harrisse: he sometimes attributed to it the date *c.* 1520, and at others "after 1521." This second date is given only as a hypothesis based on two other extrapolations which I for my part cannot accept. On the evidence of the colours and the legends M is contemporary with, and by the same hand as, P and L. All the maps in P moreover, except the first, are on the same scale as M (Atlantic). The map of the Mediterranean, which is on the recto of M, formerly included on its left hand side the map of the Azores (P, map 1, verso) which was a continuation of it, and which contains the origin of a system of longitudes which is carried across the map of the Mediterranean. This map is still unpublished, and I put aside the study of these longitudes and the geographical outline of P for discussion elsewhere. The different dates proposed for the Atlas will be discussed, but I may state here that no one has yet established that the Atlas cannot have been drawn in 1519. There is, further, a small semi-circular tear on the east–west rhumb, 3·5 cms. from each side of the central fold, on all the maps in P. This tear also goes through L in the same places, and it is visible four times on M. This proves definitely that the three documents had been brought together, and that the large map, as the marks testify, was folded four times. One can establish complete identity between L and P–M on the basis of the state of the parchment, the writing both of the legends and the titles, and the colours—the blues and the greens, and particularly the two qualities of the gold. One can also affirm that below the world map there is absolutely nothing to show that the present outline has replaced an older drawing. If the outline is more like that of a Maillo map of 1548 than that of the Atlas itself, I see in this an additional proof of the authenticity of this world map.

In a word, not only does the leaf on which L is drawn form part of M and P, but the world map has emphatically the geographical outline of P. This is not a hypothesis but an indubitable fact. If one wishes to doubt L, it is necessary to question the authenticity of P as a whole, but Sig. Caraci is led to this alter-

native solely because he begins from the *a priori* idea that the post held by Lopo Homem in 1519 would not permit him to include in his maps the Magnus Sinus and the southern continent—for it is to this that his argument appears to reduce itself. I think on the contrary that one should not assume *a priori* an exaggerated idea of the geographical knowledge of this period even in high Portuguese circles, though they were the best qualified in Europe (any more than we should have an exaggerated idea of the knowledge of Catherine de Medici fifty years later). A document like the Atlas of Lopo Homem in its entirety is confirmed by some anterior maps, and is nowhere formally contradicted. Nor is it contradicted by what we know of the Portuguese—neither by their ideas on the secret of geographical knowledge, nor by this knowledge itself.

MARCEL DESTOMBES.

REVIEWS

EUROPE

THE PLACE-NAMES OF THE EAST RIDING OF YORKSHIRE AND York. By A. H. SMITH. (English Place-Name Society. Vol. XIV. General Editors: A. MAWER and F. M. STENTON.) *Cambridge: University Press*, 1937. 9 × 5½ *inches;* lx + 352 *pages; maps.* 18*s*

Dr. A. H. Smith, who has already published the survey of place-names for the North Riding in 1928, benefits not only from his own experience but from the collections made by the Rev. Armitage Goodall and Professor E. V. Gordon for their projected surveys of place-names of the East Riding. The main early source of material has been Domesday Book, and some abbey chartularies (particularly Meaux, Bridlington, and Warter) have been valuable for a slightly later period. One of the difficulties Dr. Smith has encountered has been the destruction of evidence due to changes of coastline. Field-names have also been of singularly little value.

The administrative area of the East Riding has remained practically unchanged since Viking days. Natural features, such as the North Sea, the Humber estuary, the river Ouse, and the vale of Pickering which form its boundaries, may have been obstacles to early settlers, but do not make the region a unit either geographically or topographically, as is shown by the affinity between the place-names of the East Riding and those of the North Riding and adjacent parts of the West Riding and Lincolnshire.

From this study of place-names it is clear that in the low-lying land of Holderness early settlement tended to keep to the gravel beds, better drained than the surrounding boulder clay, and that the region between the Wolds and the sea, from the evidence of names containing the old English "leah," must at one time have been forest land, while the earlier valley settlers in the east of the Riding avoided the alluvium in favour of the boulder clay, and except for Hull itself most of the settlements on the river Hull are not of any great antiquity. The higher parts of the Wolds too, with their few and intermittent streams, were avoided by early settlers who chose sites near the alluvial marshland but on the chalk slopes. Consequently one finds here few references to water in place-names and a general parallel to settlement in Lincolnshire.

The author finds that Celts have left little mark on the place-names of the region; the rivers Humber, Ouse, and Derwent, and the town of York are the only important and definite instances of Celtic nomenclature, and though there may have been others, it is not possible to draw any conclusion for any widespread British settlement. On the other hand the archaeological evidence of Anglian settlement is supported by a number of "ing" and "ingaham" names, as along the north edge of the Wolds not far from Driffield, and especially in the upper reaches of the Humber where the Angles apparently penetrated as far as the higher land, possibly landing at Brough-on-Humber and so avoiding the marshy banks of the river. The Scandinavian element common to the whole of Yorkshire seems to have been derived mainly from the Danish invasion, "thorpe," for instance, being widespread. This element is particularly strong in Buckrose wapentake, where there is also slight evidence for Norwegian settlement, which is elsewhere scanty, and this wapentake is the only one for which Domesday Book shows a greater number of Scandinavian than of English names.

These points are well illustrated by a series of useful distribution maps, and a large outline map showing parishes and wapentakes is included. O. J. P.

DIE KÜSTE DER ENGLISCHEN SCHICHTSTUFENLANDSCHAFT: eine geomorphologische Studie. By HILDEGARD BÖDLER. (Nova Acta Leopoldina, N.F., Bd. 5, Nr. 28.) *Halle (Saale): Buchdruckerei des Waisenhauses*, 1937. 10×7½ *inches;* 146–216+xvi (*plates*)*; illustrations and maps*

There is much to be learnt from Miss Bödler's thesis on the south and east coast between the Exe and the Tees. Miss Bödler spent some considerable time in England and saw a great deal of our coast line. She writes in an interesting way, and has put together a very readable account. It does not contain new and detailed investigations on any particular area, and cannot claim to be original, but it gives a clearer picture of what may be called our "softer" coasts than has yet been written. The authoress has gone to original sources and has nearly always been able to visit the ground as well. The bibliography is extensive and is fully representative. It is not of course exhaustive: it would be difficult even for an Englishman to make it so, as so much is hidden away in local county journals. The whole stretch of coastline considered is dealt with in eight sections, which are chosen with care and appreciation. In a short summary—and also in various parts of the text—the authoress has related each section to the tectonic or other factors which mainly determine its features. It is perhaps this balance between the general outline and specific detail which is the most valuable part of this thesis.

In Germany it should serve to give a sound idea of the Channel and North Sea coasts of England. In this country the specialist will realize its summary nature, but will also fully acknowledge its clarity and the way it focuses attention on essentials; the student and the general reader will find it a clear and useful account. J. A. S.

THE COLOURED COUNTIES: a short survey of the English landscape and its antiquities. By CHARLES BRADLEY FORD. *London: B. T. Batsford*, 1937. 8½×5½ *inches;* x+118 *pages; illustrations and sketch-map.* 8*s* 6*d*

The distinctive feature of this book is not the text but the illustrations, which are, in the words of the publishers, "taken direct from nature by the Dufaycolor process." Colour photography has not attained the technical perfection of monochrome photography, but its full possibilities are shown by the illustrations in this book. There are ninety-two of these illustrations from Dufaycolor photographs covering the scenery of the English countryside and coast. On the whole they are remarkably successful in conveying the more colourful aspects of the English landscape and some of them (*e.g.* Nos. 1, 14, 83) are of great beauty. Some, on the other hand, seem to suffer from one of two faults: either their outlines are blurred (*e.g.* Nos. 6, 68) sometimes even being marked by lines of false colour (*e.g.* No. 66) or they suffer from what the author calls "a slight automatic exaggeration of colour." This exaggeration or intensification seems noticeable in, for example, No. 4 where the bare trees of February have a quite unbelievable greenness. It would be as unfair to stress unduly these faults in a work of a pioneer nature as it would be to ignore the initiative and resourcefulness of the publishers in making such an interesting experiment in book illustration.

The text consists of a description of the English countryside through which the reader is taken rather breathlessly by Mr. Ford. The author knows and loves the unspoiled country of which there is, almost daily, less to know and love. He brings out clearly the charm of England's varied landscape and the mellow beauty of the villages, which, unlike many groups of modern buildings, fit so unobtrusively into their surroundings. Once, indeed, Mr. Ford's choice of words seems to be unnecessarily prosaic, that is when he refers to the grey

stone barns of the Yorkshire dales as "stone storehouses divided into two stories." "Storehouses" is a dull term for the "shippens" or "laithes" of the dales, which were called, rather appropriately, "field houses" by seventeenth-century surveyors. T. S. W.

BEITRÄGE ZUR GEOLOGIE DER WESTLICHEN MEDITERRANGEbiete. Edited by HANS STILLE. No. 18. Montagne Noire und Massiv von Mouthoumet als Teile des südwesteuropäischen Variszikums. By HANS RUDOLF VON GAERTNER; mit einem petrographischen Teil (by FRANZ ANGEL). (Abh. Ges. Wissensch. Göttingen. Math.-Phys. Klasse. III. Folge. Heft 17.) *Berlin: Weidmann*, 1937. 10×6½ *inches;* iv+260 *pages; illustrations and maps. M.*19

Besides the details, of interest only to the specialist, from the Montagne-Noire and Mouthoumet Massif, we have in this volume a discussion, as framework of reference, of the entire *Variszikum*, or field of Variscan structures, of Western Europe.

To these structures Professor Stille had applied the name "Atlantids," in allusion to the Atlantic "lateral foreland" (*Seitenfront*) against which the long east–west trend-lines of Eurasia curled towards the north. The geographer will be interested now to find, in Figs. 28 and 29, maps showing the tectonic lines and zonal limits of the Atlantids of France and Northern Spain, in amplification of a portion of the generalized map illustrating Professor Stille's communication (*Sber. preuss. Akad. Wiss.*, 1934, pp. 156–69, not as erroneously stated in the bibliography).

In these figures the importance of the now submerged Ebro mass stands out once more. During most of the Variscan era, the mass is to be read as a spur (one of two) of the hypothetical western continent (Atlantis), projecting towards the south-east from the present Biscayan deep, by the Ebro basin, nearly to the site of the Balearics. It acted thus as a subordinate foreland, belonging neither to the African mass nor to the European, which divided the Atlantids into two arcs, the Armorican and the Iberian, with subordinate lines of tectonic parting in each. With respect to the area immediately to the east, it acted also as a lateral foreland, towards which there were west-directed movements in Minorca and southern Sardinia, and round which the tectonic lines lie in *échelon*, stepped with north–south sectors. In the closing phases of the era, it is seen to have been itself overrun at both ends by the folding movements, and it will occur to the reader that just there it did not reappear as a foreland of the Alpine era.

There are some deductions implicit here of the kind stated explicitly by Professor Stille for the North Atlantic. By his hypothesis of an Atlantic continent, contemporaneous with the Variscan movements, whose external contours followed the margin of the present continental shelf, Professor Stille had challenged the distinction drawn between "Atlantic" and "Pacific" types of coast-line, referring the entire North Atlantic to Variscan lines. In the Western Mediterranean, where Alpine movements traversed the Variscan area (reaching, incidentally, to its inner limits precisely at the roots of the Variscan spurs, in Biscay and at Gibraltar), the influence of the Variscan lines must be less, but, if Fig. 29 is accepted, it is still considerable, especially in the north–south lines bordering on the Gulf of Lions. Here the conservative view is reaffirmed, against the challenge of the mobilist theory of the rotation and drift of Corsardinia from an original position in which southern Sardinia had been tacked on to Catalonia, and western Corsica to the Provençal coast round the Estérel.

North of the Pyrenees, Fig. 29 is controlled by a much larger body of earlier work than is usually available to the south. In its main lines therefore the figure is incontrovertible except on the assumption that not all of the tectonic units are *in situ*. Lines do converge north-westwards in correspondence with the shallowing of the geosynclinal towards Brittany; there is a crystalline core in the Central Plateau of France; and analogues to its outer zones exist in Corsardinia. But whether, in and near Catalonia, the lines run as shown in the figure is another matter, and it is disconcerting to note how easily conclusions reached in an earlier volume are now pushed aside. In No. 17, Catalonia, from the Llobregat north-eastwards, was explicitly referred to the Inner *Variszikum* of Sudetic (pre-Upper Carboniferous) folding, and its characters, as then described, tally well with those of the corresponding general zone, as now described. But the Mouthoumet massif is post-Sudetic, like the Eastern Pyrenees, and the temptation to simplification by including the whole of Catalonia in the post-Sudetic zone seems to have been irresistible. If, as is likely, the reality is more complex, it may be legitimate to speculate that a spur of the Ebro mass, projecting like the present Tertiary outcrops between the Pyrenees and the Montseny (where there were abnormal north-directed movements) played its part in producing it. R. A.

THE MELTING POT. By HÅKAN MÖRNE. *London: William Hodge and Co.*, 1937. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 244 *pages; illustrations and map.* 8*s* 6*d*

As the map shows, the enigmatic title of this book refers to the southern portion of the Western Balkans. The author, a Norwegian journalist who is to be congratulated on his mastery of English, was on holiday in Corfu early in 1935 when a press telegram sent him to Athens, and thence to Salonica and Kavalla, to investigate the last revolution sponsored by Venizelos. His professional investigations concluded, he turned in search of lighter copy. After a few days among the monasteries of Mount Athos he went to Thessaly to see the Meteora monasteries, and then crossed the Pindus mountains *via* Metsovo to Janina. The Albanians he saw on the way from Janina to Parga so fired his imagination that from Corfu he took ship for Durazzo, and thence crossed central Albania *via* Tirana and Elbasan to the Yugoslav frontier and Ochrida. There he took regretful leave of the Balkans.

Honesty is his supreme merit as an author. He has described exactly what he saw and heard, and has neither written up nor exaggerated his experiences. In Athens, for instance, he states frankly that he arrived too late to see more of the revolution than the triumphant return from Macedonia of General Kondylis. A northerner, he does not hide that he is blind to the italianized beauty of Corfu, distressed by the southern noisiness of the Greeks, repelled by the outward life of the monks of Athos, unmoved by mountains which are not green with pines, and unconscious of landscapes which lack running water. He has little to say of the spell woven by Corfu on more acclimatized visitors, the social charm of the Greeks, the love for his religion cherished by all but the worst of Orthodox monks, the beautiful austerity of most Greek mountains, the fascinating play of light on their summits, and the changeful colours of the plains. But he gives us delightful vignettes of simple people and simple things such as housekeeping in Corfu, the horses being loaded on a Greek troopship, the Irish friendliness of Greek revolutions, the hospitable Albanian officer at the frontier, and above all his own climb to the deserted monastery in Thessaly where he so nearly left his bones. For all of these, his honesty, and the photograph of Parga we are grateful. M. M. H.

WINE-DARK SEAS. By ERIC WHARTON. *London: Williams and Norgate*, 1937. 9×5½ *inches;* 310 *pages; illustrations and sketch-maps.* 12*s* 6*d*

In the case of Captain Wharton the publisher's blurb has not been overdone: this is a travel book by one to whom travel is the breath of life; who is "ready to see wonders in the more ordinary events of living" and yet refrains from burdening his tale with the petty grievances of the ordinary wanderer; and who, moreover, is steeped in the lore of the land he visited. The voyage from Sicily to Greece, in the 20-ton yacht *Rame*, was in some respects a family trip, but mainly a pilgrimage: both the writer and his host had long vowed to revisit in leisure and "the independence which is the pith of travel" the coasts and islands which they had first learned to know in the course of duty. Their first port of call was Zante; then over to the mainland, where they managed to visit Oeniadae and Delphi; through the Canal of Corinth and as far as Athens. Here they had to turn for home—Malta—through the Straits of Salamis, touching at Saint Athanasius in Cephalonia before leaving Greece. Captain Wharton has a shrewd wit and a sharp eye for such things as the pleasing upward curve of the bows of ships, the roofs of houses, and the toes of shoes in Eastern countries. The text is rather overloaded with quotation marks; and pleasantly lightened by the author's pencil sketches. J. P. H. M.

LAPLAND. By HUGO ADOLF BERNATZIK. Translated from the German by VIVIAN OGILVIE. *London: Constable & Co.*, 1937. 9½×6 *inches;* xvi+136 *pages; illustrations and map.* 10*s* 6*d*

In 1934, Dr. Bernatzik and his wife travelled to Swedish Lapland and a year later he published the account of his experiences and observations. The book has now been translated from the German by Mr. Vivian Ogilvie, who must be congratulated on the accuracy of the translation and the beauty of his style.

Dr. Bernatzik is an artist as well as a fine photographer, and he has missed few opportunities in bringing back a comprehensive picture of the nomad Lapps in their summer wanderings. It now only remains for some one to follow up the work he has so ably begun by illustrating the winter technique.

A brief history of the Lapps is given in the Introduction. At the present day there are still some 30,000 living in various parts of Sweden, Norway, Finland, and Russia. Consequently Lapland is neither a geographical nor a political unity, and is commonly understood to mean all those districts or "Lapp Marches" which are inhabited by Lapps. The language has undergone many changes in the course of time and has developed differently in the various areas, with the result that there are now several Lapp languages and as many as fifty dialects have apparently been distinguished. When reindeer-keeping developed is unknown. It is supposed that the Lapps, who were originally a hunting and fishing folk, gradually domesticated the wild reindeer which they found in the districts where they settled. From the economic point of view, there are three great groups of Lapps: the nomads proper, the wandering Mountain Lapps; the Forest Lapps, who have largely settled down; and the Fisher Lapps, who live mainly on the coasts. In the nineteenth century, the Protestant pastor Laestadius finally succeeded in converting the Lapps to Christianity. Unfortunately his exaggerated Puritanism destroyed the old culture, although one may still find some of the old beliefs among the Lapps of Russia.

On the casual invitation of two Jokkmokk Lapps, the author first spent a short time in their encampment in Lule-Lappmark and gives a very vivid account of the reindeer musters, the marking of the animals, and the way in which the respective owners recognize their property. He and his wife then accompanied the reindeer on their annual migration northwards and in this

way acquired some valuable information. He frequently gives one amusing insight into the minds of the Lapps themselves. For instance, he explains how unusually kind they are to their dogs, and a moment later says that "at the Last Judgement the dog is supposed to appear as the first accuser, and its testimony, good or bad, is decisive for the salvation of its master's soul." Later, a visit is made to the summer camp of the Karesuando Lapps. They are no longer permitted to follow their reindeer northwards, and have had to alter their technique and drive the deer into Jokkmokk territory, where the sparse hillsides can barely provide sufficient food.

The author is a keen psychologist and his remarks on the Lapp schools are exceedingly interesting. The absence of outside influences seems to be particularly good for the children's development. Those who had come into contact with civilization could not be fair to the requirements of nomad life, were shy of work and thought themselves more clever than their parents. The education therefore aims less at the formation of individual character than at affection and sociability towards the other members of the tribe. Wherever a number of Lapp families are in the habit of camping for some time, so-called "fixed schools" have been established. But there are also "wandering schools," which move with the *Sida* and hold their classes in tents. The text-books and readers for the three school years are admirable. In entertaining narratives the children learn about the ancient Lapp culture, pagan times, the development of reindeer-keeping, the care of reindeer, and the general evolution of mankind. Health instruction is also included, the history and geography of Scandinavia with special reference to Lapland, ancient sagas, legends and stories of their own people. The Lapp children therefore receive a general education which helps them to gain a thorough knowledge and love of nomad life.

Throughout the book, Dr. Bernatzik shows an understanding sympathy with the Lapp people as well as the natural and political difficulties they continually have to face. He has amplified his experiences by reference to the existing Swedish literature and includes a number of Lapp tales and sagas. Finally he closes with a plea for more tolerance to be shown in regard to international boundaries and the hope that the nomad life, which has remained unchanged for hundreds of years, should be allowed to continue.

The numerous plates are very well reproduced. There is no index; and the map contains few of the places mentioned in the text. N. A. C. C.

ASIA

ANCIENT CYPRUS: its art and archaeology. By STANLEY CASSON. *London: Methuen & Co.*, 1937. $7\frac{1}{2} \times 5$ *inches;* xii + 214 *pages; illustrations and sketch-map.* 7*s* 6*d*

This is an interesting series of essays, dealing with prehistoric Cyprus; with the Cypriot script, as yet practically undeciphered; with the nature (so far as it can be deduced or inferred from archaeological data, and epigraphical material found in Cyprus, Egypt, and Assyria) of the petty city kingships which existed in various parts of the Island from about 1400 B.C. onwards; and with Cypriot art.

Mr. Casson holds that Cyprus first derived its Greek sympathies from "Achaean immigration" 1600–1200 B.C., which, though the island was then nominally under the tutelage of the Hittites of Asia Minor, introduced, at least in the cities subject to local kings, "the Mycenaean mode of life." On the other hand the "pre-Achaean Cypriots were, as far as we can tell, neither of Greek blood nor of the Greek language. They were the descendants of the Anatolians

of the Bronze Age and these seem to have persisted to the end, and largely to have reinforced the insular and 'nationalistic' characteristics of Cypriot history and art. It is to them that we can perhaps attribute the 'nationalistic' tendency which sought to preserve the ancient syllabary and to use it as a rival to the new-fangled Greek characters." It is suggested that these Bronze Age people were "pastoral and agricultural people who inhabited the lowlands and plains, and the richness of their burial furnishings presupposes a view of after-life which considered it as in some sort a replica of this." On the other hand "Kurion, Salamis, and the other cities which sprung up were due to immigrant colonists of the Mycenaean world, who brought with them one of the most striking features of the Achaean world of the Mainland, the Achaean Kingship."

The detail supporting this general hypothesis is worked out with ingenuity and supported by archaeological data, though Mr. Casson in numerous instances seems to disagree with opinion which must be regarded as authoritative. Much however remains uncertain, and the accuracy of inferences and hypotheses can only be proved by further exploration and research both in Cyprus itself and in neighbouring countries. The author's own conception of the relation of Cyprus both to the Greek world, and to the neighbouring civilizations, usually termed Oriental, is set out with clarity and acumen. The book in fact cannot fail to appeal to the imagination of all who are interested in the "Enchanted Island" itself, or in the Levant generally, though it is very doubtful how far inferences from archaeological data or finds, which may perhaps legitimately be drawn in respect of the Achaean aristocracy predicated for the half-dozen or so ancient Greek cities of Cyprus, should be applied (as Mr. Casson in a number of instances applies them) to Cyprus and Cypriots as a whole.

In the middle ages right down to the Turkish Conquest, the power or powers which nominally were the governing factors in Cyprus never seem to have been in close touch with the population as a whole. The Crusaders, Lusignans, and Venetians were small European aristocracies who lived mainly in fortresses and walled towns, and who held down the real Cypriot population as best they could. The mass of Cypriots were treated as serfs, or in the alternative the Cypriots were not administered by them at all, but did what they liked.

It would seem—accepting Mr. Casson's main hypothesis—that this analogy had held good from the earliest times of foreign invasion: in other words, though both archaeology and epigraphy have little record of the Bronze Age Anatolian Cypriots, among whom the Achaean Kinglets are thought to have founded their Greek cities, yet it was they rather than the Greek immigrants who continued to form the bulk of the population of Cyprus, and to resist in some degree, or else to modify considerably the external influence on Cyprus both of Classical Greece and of the Asiatic kingdoms and powers.

The spirit of an exclusive, rival, and local city autonomy has persisted in Cyprus right down to the present time, and there is still both in language and culture a broad distinction between the urban populations of the six main towns of Cyprus (however differentiated they may be as between each other) and the rural population of the island as a whole, which still may be said to represent, as far as it is possible for anything now to represent, the autochthonous Anatolian Cypriots, whom Mr. Casson predicates.

When therefore in his preface Mr. Casson writes "I prefer to see the history and art of Cypriots as those of Oriental Greeks rather than of Hellenized Orientals," he may be quite correct as regards the art of those towns or localities where rich discoveries have been made; yet the history of Cyprus is virtually the history of successive foreign aristocracies—Egyptian, Achaean, Assyrian, Persian, Macedonian, Ptolemaic, Roman, Byzantine, Arab, Lusignan,

Venetian, Turkish—all of whom tried to use Cyprus and the Cypriots for their own purposes. The great majority of Cypriots, that is to say the great bulk of the population who according to Mr. Casson were originally of Bronze Age Anatolian stock, have identified themselves with none of these, not even with the Achaeans.

Mr. Casson thus to some extent inadvertently enmeshes history and art in modern politics. H. R. P.

BAGHDAD SKETCHES. By FREYA STARK. *London: John Murray*, 1937. 9×5½ *inches;* xiv+270 *pages; illustrations and sketch-map.* 12*s* 6*d*

"Even now," wrote Miss Stark in 1931 in the first of her Baghdad Sketches, "the crossing of the desert is an everyday affair. . . . In the place where the old Arabian singers saw the three blackened hearthstones of the Beloved in the deserted camp, we now pass the derelict skeletons of cars." The invention of the small internal-combustion engine has nowhere effected profounder changes than in Western Asia. Here it has inflicted a mortal injury on a whole social system, which is now dying before our eyes.

It was to a Baghdad in transition, "a hybrid between East and West," "of sordid aspect," that Miss Stark came in 1931. Scorning convention she rented a small house in the heart of the old city, until, with the arrival of the first rains, the smells drove her to change her lodging for an upper room in the house of a Syrian Catholic family. To improve her Arabic she went to the Government school for girls. Mixing with all and sundry, she entered with zest into the varied life of Baghdad. With her landlady she read the Gospel over a bonfire on Christmas Eve and, before dawn, went on to Mass in the Syrian church. With Muslim friends she took part in the night-life of Ramadhan and even performed a nocturnal pilgrimage in the Shi'a shrine of Kadhimain. She debated with young effendis implacably bent on destroying the old, and with nationalists convinced that the art of government could be learned in a couple of years. Then, feeling her way farther afield, she visited in turn the semi-sedentary 'Azza tribe in the Ghurfa south of the Jabal Hamrin, the badawin Shammar north of Tell 'Afar, the principal Yazidi shrine of Shaikh 'Adi beyond Mosul, the thirsty, dying Turkoman-Luri township of Mandali on the Iranian border, and finally the independent amirate of Kuweit at the head of the Persian Gulf.

To amuse her friends Miss Stark wrote for the *Baghdad Times* a series of sketches describing her every-day life. And charming pictures they are, instinct with the qualities that we associate with their author: acute observation, delicate humour, sympathy and comprehension, impatience of convention and pompous authority. They were published in book form in Baghdad in 1932. Evidently Miss Stark was already a master of her craft; the descriptions of life in the city are in their way perfect, and it is only in the accounts of her trips farther afield that the reader may perhaps detect that the traveller of 1931 was not yet the confident explorer and orientalist of to-day. The present work, bearing the same title, contains all the original sketches, supplemented by one of the same date (then withheld for understandable reasons), and eight more, the product of another visit to those parts in 1937. Two of the new sketches describe visits to the Shi'a holy cities of Najaf and Samarra, and thence up the Tigris to Tikrit, which was a flourishing Christian town in the tenth century, and where Saladin was born in the twelfth. The other six are devoted to the amirate of Kuweit; and it is these, together with the original Kuweit sketch, that will probably have the greatest interest for the geographer.

For Kuweit, if anywhere, is the perfect microcosm of classical Arabia. The Arab is the nomad of the desert, the seaman, and the merchant. There all these

types exist together in their natural surroundings. On three sides the town abuts upon the desert, and just inside the walls is the great *maidān* where the badawin bivouac in convenient proximity to the booths for camel saddlery and tent furnishings; within are the long, cool bazaars of the bankers, merchants and shopkeepers; on the fourth side opposite the sea are the shipyards, and drawn up along the shore the lovely lines of countless boats of every type, the great ocean-going *būms* of the Zanzibar trade, the pearling fleet, the water-boats that ply to the Shatt al 'Arab. Although the Imperial Airways machines land regularly just outside the walls, and an Anglo-American company is prospecting for oil, Kuweit has so far come through unscathed. Miss Stark has earned our gratitude for her timely visit and for her lively and colourful account of the town, the desert around, and one of the dependent islands.

The book is illustrated with the ten attractive pen-and-ink drawings by E. N. Prescott of the original Baghdad edition, and numerous admirable photographs by the author herself. C. J. E.

EVEREST: the unfinished adventure. By HUGH RUTTLEDGE. *[London]: Hodder & Stoughton*, 1937. 10½×7 *inches; 296 pages+63 plates; illustrations and maps. 25s*

Mr. Ruttledge has had a very difficult task to accomplish. He has already written a book on the 1933 expedition, and the ground which he must now cover again is familiar to his readers, both general and expert; moreover, he writes without the aid of fresh incident from altitudes above 24,000 feet. Nevertheless, he has accomplished his task with the utmost skill, and the result is a narrative no less stimulating than 'Everest 1933,' enriched by valuable essays on special subjects by four of his companions. The illustrations are placed at the end of the book, and are well reproduced.

The story of the expedition may be briefly told. All went well until the party reached the foot of the mountain. Thereafter they were dogged by misfortune, owing to the exceptionally early arrival of the monsoon. Immediately after the establishment of Camp IV on the North Col, the eastern approach to this camp was closed by avalanche danger, and the party transferred their attention to the western approach (rejected by the Reconnaissance party of 1921), proving the possibility of a route to the col from the Main Rongbuk Glacier, which, if more difficult and exposed to cold winds than the eastern approach, is safer from avalanches and might serve as a bolt-hole for a party trapped by monsoon conditions on the mountain.

In this expedition the determining factor was the weather. The short interval between winter conditions and the coming of the monsoon is the only period available for the assault, the upper slabs being then swept bare of snow; once the monsoon has broken snow conditions above 23,000 feet make progress impossible. The main objects therefore are: so to time the acclimatization of the party that they may be ready to seize the favourable moment before physical deterioration sets in, and to establish a camp as near as possible to the final couloir. As yet however there is no reliable method of forecasting the date of arrival of the monsoon. "The leader must be prepared for an early monsoon, yet the twin evils of inactivity and deterioration are ready to sap the moral and physique of his party in the event of a late one." The weather data collected in 1933 and 1936 may well be of great assistance to any future party. The problem of the last 1000 feet is discussed by Dr. Warren on pp. 244–45 with regard to the use of oxygen; he concludes that it should be used for the last lap only, by a specially trained oxygen party, and that even with a weight of 35 lb. and only a six-hour supply of oxygen it should be possible to reach the summit and

return. With this should be read Dr. Humphreys' words on whether consciousness can be retained at heights above 28,000 feet without the aid of oxygen (pp. 206–07).

Absorbing as is the narrative of the expedition in itself, Mr. Ruttledge renders it the more living by personal touches and generous tributes to the help of others, whether Europeans or porters, in the division of duties. With the experience of five previous expeditions, every detail of strategy was worked out as far as possible before the party entered Tibet, in consequence of which the climbers were at the base of their objective in accordance with the time-table. It was the irony of fate which set so large a gap between these well-laid plans and the due reward of success.

In his opening chapter the author touches on more fundamental questions. "Mountaineering," he writes, "has always been the sport of lovers of Nature, of men who preferred the quiet hills to the clamorous arena." Is there not a danger, he asks, that the growth of such things as specialization, publicity, and nationalism may threaten the old ideals with extinction? His own experience of Everest parties is a welcome reassurance: "members would not be human if they did not hope themselves to reach the summit; but I had the impression that, provided they could do well enough to secure or retain the respect of fellow-climbers, they were content." The mere healthy materialist, he concludes, is not the man for Mount Everest. "When the real strain comes, his appetites will hold him back while the men of ideals go forward, supported at the last by that power of the spirit which surpasses the physical." In reading this book one is conscious throughout that these words are characteristic of the author's outlook, and that he has not merely understood but in himself embodied this spirit of mutual help. H. E. G. T.

THE INVASION OF CHINA BY THE WESTERN WORLD. By E. R. HUGHES. (The Pioneer Histories. Edited by V. T. HARLOW and J. A. WILLIAMSON.) *London: Adam and Charles Black*, 1937. 9×5½ *inches;* xvi+324 *pages; maps.* 15*s*

The book forms one of the series of the Pioneer Histories. The author, who is Reader in Chinese Religion and Philosophy in the University of Oxford, states that his work is not a history of trade or war or diplomatic contest but an account of the penetration of China by Western culture and ideas. Chapter I gives an outline of political events, and the subsequent chapters (II–VII) deal with the missionary influence, the influence of Western political thought, the destruction of the old education, Western science and medicine, the new literature, and, finally, a survey of China to-day. Appendix I gives biographical notes on some of the modern Chinese writers; Appendix II enumerates the experts sent to China through the League of Nations. E. C. W.

AFRICA

PRESENT-DAY MOROCCO: a practical guide . . . By Major O. H. WARNE. *London: George Allen and Unwin*, 1937. 6½×4 *inches;* xviii+260 *pages; illustrations, plans, and map.* 5*s* 6*d*

Here at last is a good guide to Morocco. About one-third of the book is devoted to useful summaries of the country's physical features, flora and fauna, history, modern agricultural, industrial, and transport, developments, along with much generally accurate information under the heading "Practical information" which will be very helpful to new arrivals, while the list of shipping lines, their services and fares, will be particularly appreciated by those arranging their first visit.

The "List of principal books in English on Morocco" is representative, although none of Westermarck's books—the greatest of all books on Morocco in any language—find a place, and the work on 'The folklore of Morocco' by Françoise Legey is wrongly attributed to its translator as author, both of which facts make one think that perhaps the author is not as familiar with the literature of the country as a would-be guide should be. There is a useful list of Arabic terms and place-names, as used in the text and on the accompanying folded map, but since these are the everyday French renderings, which are not the same as those used in the Spanish Zone, and in any case are not correctly transliterated, a note to this effect should have been given, as they can be misleading to the uninformed. The "Guide and road book" section, which forms two-thirds of the book, is arranged by towns, and excursions from these. A summary account of the history of each town is given, as well as a brief description of the principal objects in each which the tourist is likely to find interesting. The motorist will welcome the simplified plans given for each of the more important towns, showing the location of objects of interest in relation to easiest means of access by car. Hotels, motor-coach services, etc., are indicated, and there is a considerable number of well-chosen photographic illustrations. This section is generally accurate, and for that reason it is all the more a pity that the ridiculous story about Sheshawen not having been visited by a Christian before 1920 (p. 103) has found its way into yet another book. The author should consult 'The land of an African Sultan' published by W. B. Harris in 1889—given in his own list of books—where he will find an account of that writer's visit to Sheshawen fifty years ago, along with a panoramic sketch of the town.

A table of kilometric distances and a fairly detailed index add to the value of the book, and a copy of 'Maroc au 1,500,000e: Carte kilométrique des Routes et Chemins de fer'—a map published by the French Government—which is also a coloured relief map, is a very useful addition.

In spite of its occasional blemishes therefore, this guide supersedes all other books in English which have aspired to guide the English-reading tourist to Morocco, and is a very welcome addition to the literature in English on that country. W. F.

HISTOIRE DES POPULATIONS DU SOUDAN CENTRAL (COLONIE du Niger). By Capitaine Y. URVOY. (Publns. Com. Études Hist. et Scient. Afrique Occidentale Française. Sér. A. No. 5.) *Paris: Larose*, 1936. 10×6½ *inches;* 350 *pages; illustrations and maps*

The subject of this book is the history of the native races of the western Sudan in the grassland region between Timbuktu and Lake Chad. The author has limited himself to the historical treatment of his subject, and has for the most part excluded general anthropological and geographical considerations. This severely chronological treatment of the complex history of the western Sudan from mediaeval to modern times is decidedly stiff reading, and of little attraction to any but experts in this chapter of African native history. The absence of any index renders the use of this volume more difficult.

The author divides his work into three main parts. The first treats of the Middle Niger, and of the Songhai Empire and its successors; the second of the Tuaregs of Aïr and the Oullimindens of the east; and the third of the Hausa states. Diagrammatic maps of migrations and native states at various dates between the seventh and nineteenth centuries are added as appendices.

Since the author intends to do no more than present a compilation of historical material which will serve for more general works in the future, the value of his

work depends upon his treatment of the historical sources available. He gives some details as to what these are. In addition to the better-known printed sources—the Arab geographers of the middle ages, the chroniclers of the Songhai and Fulani empires, and the later European travellers—he has used publications by officials produced since the French occupation, local Arabic manuscripts (*e.g.* the chronicles preserved by the Tuaregs of Aïr, already published by him in the *Journal des Africanistes*, 1934) and oral traditions.

There is clearly much of local importance contained in the chronological narrative thus produced, but a critical estimate of the comparative value of each item is difficult in the absence of fuller and more constant reference to the original sources used in each particular case. G. O. W.

A SHORT HISTORY OF NIGERIA. By C. R. NIVEN. *London: Longmans, Green and Co.*, 1937. $7\frac{1}{2} \times 5$ *inches;* x+262 *pages; maps.* 3*s* 9*d*

Into a small volume of 250 pages Mr. Niven has packed the whole known history of Nigeria. Nigeria has for centuries been the meeting point and battle ground of competing racial and cultural influences. Hausaland and the indigenous races of the western Sudan have generally given a ready welcome to newcomers and new ideas. In the distant past we can trace immigrants and ideas from Egypt and the Arab countries in the east. From the north and west we see the slow infiltration of the strange Fulani race and the sudden inrush of Moorish conquest in the sixteenth century. In the south-east there is a more recent but dimmer outline of immigrant Bantu races. In the Bights of Benin and Biafra we have a fairly exact chronology of Portuguese exploration and of the British and other European mariners who followed the Portuguese. Then comes the story of the overseas slave trade, which began as a criminal blunder by otherwise highminded men. Lastly, a century of European effort to solve the mystery of the river Niger, and to overcome the two dragons that guarded the secrets and wealth of Nigeria: the Saharan desert in the north, and in the south malaria and tropical disease.

Mr. Niven finds room to describe in considerable detail Hausaland and Bornu before the coming of Europeans. He does not mention Sultan Momman Bello's history, "Infaku'l Maisuri," but his account of the Fulani jihad is obviously derived from it. For the early history of Southern Nigeria less material exists, and in one important instance Mr. Niven has not made the best use of it. He dismisses the Carthaginian influence in West Africa as "the journey of a Carthaginian admiral, over two thousand years ago, who sailed down the West African coast and left a short narrative." But Professor Gautier has suggested another interpretation of Carthaginian history and of Hanno's miscalled "Periplus" which brings quite a new light to the past of West Africa. Without that light Mr. Niven can only record without explanation the remarkable phenomena of Benin bronze work and ivory and wood carving in the fifteenth century, and the ancient sculptures of Ife.

When he comes to the nineteenth century Mr. Niven gives an admirable account of Britain's determined efforts to kill the slave trade; of the devastation of continual war by the Fulani Moslems of Ilorin, the warriors and amazons of Dahomey and the competing Yoruba and Egba tribes; and of the magnificent work of men like Captain Glover in Lagos and Consul Beecroft in the Oil Rivers to bring peace and some respite from the worst inhumanities.

When describing the administrative problem of Northern Nigeria solved by Sir Frederick Lugard in 1903, Mr. Niven states that each Emir "had a Council to advise him on all his official actions." This is not quite the case. Each Emir had his Court with many high officials in daily attendance whom

he consulted as he chose, but, so far from there being any formal council of state, it was notorious in every Emirate that the favourite slaves of the household had more influence than any one else.

Postwar geography and the Permanent Mandates Commission have accustomed us to the old English name "Cameroons" (derived from the Portuguese original *Camerões*) in its French form "Cameroun" and the German "Kamerun." Surely there is no need for the author to invent a new hybrid, "Kameroon." A more serious error is the statement that the former German Colonies were handed over to the League of Nations. That is not historically true: the allied Powers assigned the German colonies to their present holders, and bound them by covenant and mandate to render account of their administration to the League. E. J. A.

EUROPEAN BEGINNINGS IN WEST AFRICA, 1454–1578. By J. W. BLAKE. (Royal Empire Society Imperial Studies. No. 14. General Editor: A. P. NEWTON.) *London: Longmans, Green and Co.*, 1937. 9×5½ *inches;* viii+212 *pages; maps.* 10*s* 6*d*

Mr. Blake has written an interesting and useful account of the Portuguese rule in West Africa, especially in its economic aspects, during the century following the discovery. For the earlier portion of the period, the evidence is scanty, and such as it is, has been printed by Portuguese historians. Besides making it available to English readers, he has interpreted it skilfully. For the later portion, he has used much documentary material in British archives.

His theme is the attempt by Portugal to establish a trading monopoly on the West African coast, and the efforts of Castile in the fifteenth century, and of France and England in the sixteenth, to defeat this aim. The value of the trade with Guinea has been obscured by that of Brazil and the East Indies, but he shows that it was by no means unimportant to Portugal, and that John III, for example, was fully aware of this, but lacked the naval power to render it secure. After 1530, he had to meet the ravages of French interlopers; twenty years later these were joined by the English, of whom Thomas Wyndham and John Lok were the earliest. Before these inroads, the Portuguese monopoly waned.

Mr. Blake has not extended his survey to the commercial system of the interior, which centred around Timbuktu and the "Empire of Melli." This however might have helped to explain the attitude of other Mediterranean nations towards the Portuguese claim to exclusive sovereignty. Italians, Catalans, and others had been trading in North Africa through intermediaries with the Western Sudan, and it would be natural that they should resent the Portuguese claim to possession of Guinea based upon discovery and partial occupation of the coast-line. As the author shows, Prince Henry's initial object had been to replace the established land routes by a sea-route under his control.

In its wider aspects, this book is to be warmly commended to those interested in the foundations of European imperialism overseas. G. R. C.

THE USEFUL PLANTS OF WEST TROPICAL AFRICA. By J. M. DALZIEL: being an appendix to the 'Flora of West Tropical Africa,' by J. HUTCHINSON and J. M. DALZIEL. *London: Crown Agents*, 1937. 10×6½ *inches;* xii+612 *pages.* 18*s*

Dr. Dalziel has here brought together an immense amount of information on the uses, folk lore, and vernacular names of the indigenous and crop plants of West Tropical Africa. The work is arranged botanically and follows the sequence used in the Flora. Under each species are given the vernacular names

current in the various dialects, extensive information on medicinal, economic and other uses, and a list of references. There is a bibliography, and indexes of vernacular, common and scientific names. The number of vernacular names listed is estimated at twenty thousand and, despite the use of small type, their indexing occupies nearly forty-three pages.

Dr. Dalziel's unique combination of medical, botanical and linguistic knowledge, together with his unremitting industry, has produced a volume which will be of permanent value to all who are concerned with the history, customs or welfare of the West African native. J. S. L. G.

NORTH AMERICA

HISTORIC SPOTS IN CALIFORNIA: counties of the Coast Range. By MILDRED BROOKE HOOVER, [under the aegis of] "Daughters of the American Revolution." *Stanford (Calif.): University Press—London: H. Milford*, 1937. 8×5¹/₂ *inches;* xxiv+718 *pages; county map.* 18*s*

This work is the third and final volume of a book on the topography of California. The two previous volumes have already been reviewed in the *Journal* (*Geogr. J.*, 80 (1932) 455; 88 (1936) 468–9), and the present book follows the general plan of the series. The area described is included in the eighteen counties of the Coast Range—the western section of California. The counties are arranged in alphabetical order and the history of the "historic spots" of each county is discussed. Full bibliographies follow each section. The method of treatment involves considerable repetition. As in the previous volumes the number of "Ghost Towns" is remarkable. Several of these were coalmining towns in the Mount Diablo field and were originally peopled by English and Welsh miners. The epitaphs of some of the latter are engraved on their tombstones in the Welsh language. There is an account in this volume of the discovery in 1936, of the brass plate believed to have been set up by Sir Francis Drake in 1579. The history of the vineyards and wineries of Napa County, the early development of San Francisco, the Russian settlements in California, the preservation of the Redwoods of Santa Cruz County, the changes of the seat of the capital of the State from San José to Vallejo and then to Sacramento all find a place in this volume, and are examples of the interesting material which can be mined from it. As was remarked in the previous reviews the alphabetical arrangement by counties makes the book more useful to a resident in California than to the general reader in England. The thoroughness of the index must be praised, and the series as a whole forms an encyclopaedia of topographical information about California. E. W. G.

THE AMERICAN PEOPLE: studies in population . . . (in the United States). Edited by LOUIS I. DUBLIN. (Vol. 188. November 1936 of "The Annals".) *Philadelphia: The American Academy of Political and Social Science*, 1936. 9×6¹/₂ *inches;* xii+396 *pages; maps and diagrams.*

This volume is a special number of the *Annals of the American Academy of Political and Social Science*, and is entirely devoted to population studies of the people of the United States of America. Since the Great War, and especially during the last five years, general interest has been aroused in the importance of population problems and the relation of these questions to world peace. That these topics have been closely studied in the United States is made clear by this new volume. The aim of the editor has been "to co-ordinate the investigations of American demographers" by collecting in one book a series of thirty-three essays. The average length of each article is only ten pages, and the essays

suffer sometimes rather badly from the inevitable compression. The papers are grouped together under the following six headings: reproduction, mortality and morbidity, population increase and structure, relation of population to resources, world population problems, and organization of population research. Articles of special interest to geographers are those by Joseph A. Hill on "Composition of the American population by race and country of origin," by Warren S. Thompson on "The distribution of population," by O. E. Baker on "Rural and urban distribution of the population in the United States," and by Harold F. Dorn and Frank Lorimer on "Migration, reproduction, and population adjustment." The last paper contains a useful account of the changes in the regional distribution of population that have taken place in the United States during the period 1920–30.

Throughout the book the reader will find that the racial differences in the composition of the population of the United States are reflected in the vital statistics; for instance the infantile mortality rates among the white and the negro population were 52·8 for white and 91·3 for coloured respectively in 1933. The necessity for full and accurate vital statistics is obvious, and it is strange to learn that American birth statistics only go back as far as 1915, though indirect estimates can be made back to 1875. The available figures for the American birth rate show the same characteristic decline that has been observed in England and Wales and in other European countries. The seriousness of this decline is fully realized in the United States, and this volume is a mine of useful statistical information on many aspects of this important subject.

E. W. G.

CENTRAL AND SOUTH AMERICA

THE GEOLOGY AND BIOLOGY OF THE SAN CARLOS MOUNTAINS, Tamaulipas, Mexico. Reports of the University of Michigan Expedition to the San Carlos Mountains in 1930. Directed by LEWIS BURNETT KELLUM. (University of Michigan Studies. Scientific Series. Vol. XII.) *Ann Arbor: University of Michigan Press*, 1937. 11 × 8 *inches;* xii + 342 *pages; illustrations and maps.* $5.00

The San Carlos mountains are a 3500-foot uplift of Cretaceous and igneous rocks in the coastal plane of north-east Mexico, about 25° N., 99° W., midway between the Gulf coast and the eastern front of the Sierra Madre. They were studied by an expedition from the University of Michigan in 1930, and the results are recorded in this handsome volume. It consists of nine monographs, chief of which are those of Professor Kellum on the sedimentary, and Professor E. H. Watson on the igneous rocks, and Professor E. S. Bastin on the ore deposits. Mr. R. W. Imlay deals with one minor area in detail; Mr. L. R. Dice with the mammals; and there are shorter accounts of the arachnids, fishes, amphibians, and reptiles.

The whole San Carlos range is an arcuate anticlinorium trending east–west with convexity to the south. The sedimentary rocks are almost entirely Cretaceous limestones and shales, the uplift being of early Tertiary date. The igneous rocks are post-Cretaceous intrusions, mainly sills and laccolites, of two distinct series—normal and alkalic—and there are some very late basaltic lava flows. The ores are of copper and silver-lead, the mines largely worked out. The region is semi-arid, with topography clearly related to geological structure, but a number of distinct plant communities are recognized, with associated mammalian faunules. These are mainly of carnivores and rodents, essentially neotropical but with some nearctic forms. A. M. D.

LA FAMILLE OTOMI-PAME DU MEXIQUE CENTRAL. By JACQUES SOUSTELLE. *Paris: Institut d'Ethnologie* (*Trav. et Mém. XXVI*), 1937. 10½×7 *inches;* xvi, 572+xvii *plates; illustrations and maps.* 100 *fr.* (*Étranger* 125 *fr.*)

The author, who has carried on his research on the Indian population of central Mexico for over two years, was led to conclude that a nation is nothing but a language. He thinks that the only way of finding out which villages can be safely reckoned as belonging to the Otomi-Pame group is to make a thorough linguistic inquiry. This has been done in over fifty places. The basis of this work was a list of 378 words and short sentences, which is fully given in the book and should be valuable as a guide to similar studies. From the research we get a complete lay out of the districts speaking Otomi, Mazahua, Matlalzica, Pame and Chichimeque. We further get a full description of the phonetical and grammatical structure of these languages and their differences. The point of departure is the village of San José del Sitio near the capital. There are two points of outstanding interest for the study of non-European tongues: the functions of noun, verb and adjective can be fulfilled by the same word, and the tenses of the verb do not indicate the time of action, but express its aspects, such as duration or completion.

But the book is not limited to the philological aspect of the subject. We get a detailed report on the conditions of the Otomi, who to-day live in the mountainous regions and valleys of the central high plateau as more or less poor peasants, struggling against the mining towns and the haziendas of the cattle raisers. We get an insight into their religious ideas and their magic rites, many of them not accessible to the outsider. Of particular importance appears to be the institution of the "oratoire" where the head of the family has to perform certain rites at the festivals, and the chains of mutual services and gifts which bind the different heads of family and hold the community together.

Last but not least we get the history of the Otomi who were gradually driven away from the plains in the east into the mountains where they live to-day, and of the cruel destruction of the Pame after the Spanish conquest. We also learn much about the history of their languages and of the clash of cultures in the linguistic field. We are told how the question of languages became a question of social conditions and how it is that Otomi has become the speech of the lower classes even in the suburbs of the towns. Many illustrations of natives and their materials and implements of culture, and many diagrams complete this excellent book. R. B.

COCLÉ: an archaeological study of central Panama. Part I. Historical background: excavations at the Sitio Conte: artifacts and ornaments. By SAMUEL KIRKLAND LOTHROP (and others). (Memoirs of the Peabody Museum . . . Harvard University. Vol. VII.) *Cambridge, Massachusetts: Peabody Museum,* 1937. 14×11 *inches;* xviii+328 *pages; illustrations, plans, and sketch-map.* $12.50

Dr. Lothrop's volume on the excavations at the Conte site in the Province of Coclé, north-western Panama, is a notable addition to the Memoirs on archaeological study issued by the Peabody Museum. This, the seventh, forms the first of two parts dealing with Coclé, each prepared by Dr. Lothrop in collaboration with his scientific helpers. European archaeologists, perennially hampered by lack of funds, cannot but envy the resources which enable several institutions of the United States to attract a body of trained men of science, to give them all necessary aids in prolonged and detailed field work, and to publish the results of many angles of investigation in a manner worthy of the work.

The Coclé region was first known to the Spanish *conquistadores* in Panama early in the sixteenth century; but, after powerful native chiefs had been overcome and large quantities of treasure, in worked gold, had been obtained, Coclé became sparsely populated and of little but agricultural value. Within the present century the action of the shifting Coclé river exposed ancient graves, and fine pottery and gold ornaments were found; but any excavations made were without scientific direction. In 1931 however investigators connected with the Peabody Museum made arrangements with the local owners of the most promising region along the banks of the river—the Conte site, near the town of Penonomé—and six years' of labour have been generously rewarded, as Dr. Lothrop's valuable record demonstrates.

The frontispiece of the book, and three other coloured plates, bear witness to the high grade of craftsmanship attained by the ancient jeweller of Panama; perhaps especially striking are the richly worked gold ornaments in which polished emeralds are inserted. Both personal adornments and household pottery, says Dr. Lothrop, correspond to descriptions of contemporary articles looted by sixteenth-century Spaniards. These spectacular results of excavations are only second in importance to the scientific investigations, shedding light on native culture. Photographs of the Coclé country, sketch-maps, drawings of objects, and technical tables, are thoroughly informing.

The format of the volume is rather unwieldy, but the large page undoubtedly lends itself to the display of extremely fine plates. L. E. J.

AUSTRALASIA AND PACIFIC

ANTIPODEAN JOURNEY. By MARGARET L. MACPHERSON. *London: Hutchinson & Co.*, 1937. 9×5½ *inches;* 288 *pages; illustrations.* 12*s* 6*d*

The author was inspired by Mr. Bernard Shaw to write this gossipy humorous account of leisurely treks through New Zealand, Australia, and some of the more familiar Pacific Islands. It is an honest, impressionistic account, which makes very attractive reading for the casual seeker of travel literature. Despite the fact that she was born in Yorkshire it is obvious that the author is a truer New Zealander than many who were actually born under the Southern Cross. The descriptions of the carefree democracy of Australasia are particularly fine; and she provides excellent word-pictures of the cities of the countries visited. Unhappily Mrs. MacPherson has no flair for accuracy: one regrets that she did not submit her manuscript to some person who had been longer in some of the territories about which she wrote. If one can forgive numerous easily avoidable errors, and a rather irritating young man named Hamish, then there is much in her book to admire and enjoy. A. J. M.

POLAR REGIONS

EXPLORING WITH BYRD: episodes from an adventurous life. Compiled and revised by Rear-Admiral RICHARD E. BYRD. *New York [and London]: G. P. Putnam's Sons*, 1937. 9×6 *inches;* viii+242 *pages; illustrations and maps.* 10*s* 6*d*

This is a condensed record, largely drawn from old material, of Admiral Byrd's life as an explorer and pioneer airman. He must hold a number of records in this field. He has flown across the Atlantic, looked down upon both Poles, and been in charge of two enormous expeditions—one might almost call them scientific invasions—in Antarctica.

The details of Admiral Byrd's pioneer work may be found elsewhere; but

reading the story in this book, quickly and as a whole, one is strongly impressed by the scope, intelligence, and courage of a mind which can appreciate and exploit the new asset of aerial exploration; can navigate a swiftly moving vehicle in those parts of the world where one can almost touch a different meridian with either hand; which can govern an army of explorers, interested in such diverse subjects as the broadcasting of a variety programme and the study of intricate physical phenomena, or be content to spend a lonely winter in the most southerly weather station in the world. J. M. S.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

ALLGEMEINE ERDKUNDE. By HERMANN WAGNER. Elfte, neubearbeitete Auflage seines Lehrbuchs der Geographie, herausgegeben von WILHELM MEINARDUS. I. Teil. Mathematische Geographie. *Hannover: Hahn*, 1938. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* xiv+394 *pages; diagrams. M.*10

This volume is part of the eleventh edition of the late Hermann Wagner's geographical text-book, revised by Professor Wilhelm Meinardus. Under the title of Mathematical Geography are grouped geodesy, geophysics, surveying, field astronomy, map projections and cartography. In order to include so many subjects in one volume, it has been necessary to deal very briefly with each. As a short history of every subject is included, the space available for explanations of modern methods and processes is still further curtailed. But the student is given a large number of references to other books, and if he has access to a good library, he should be able to supplement the information contained in this volume. In fact, the extensive bibliography is its outstanding feature, and much labour must have been devoted to its preparation.

Although the book bears the title 'Mathematical Geography,' the mathematical content is small. Few formulae are given, and the proofs of them are generally omitted. Only eleven lines are devoted to the theodolite, but two or three pages are allotted to obsolete instruments used for surveying and navigation. More attention is given to the history of surveying than to the actual practice. The same criticism applies to the pages devoted to geodesy, astronomy, and map projections. For this reason the book can be of little help to students who wish to gain a practical knowledge of the subjects dealt with.

Where so much has been included it is perhaps unfair to search for omissions, but some of these are important. For instance, no account is given of the methods used for base measurement with wires in catenary; the prismatic astrolabe is not mentioned. In conclusion, it is evident that the book is intended for the use of students who wish to obtain only a general knowledge of the subjects dealt with, and who are interested chiefly in the history of those subjects. Probably many teachers of geography will find that the book fully satisfies their requirements. J. E. E. C.

OUTLINES OF HISTORICAL GEOLOGY. By CHARLES SCHUCHERT and CARL O. DUNBAR. Third edition, entirely rewritten. *New York: John Wiley & Sons—London: Chapman and Hall*, 1937. 9×6 *inches;* vi+242 *pages; illustrations and maps.* 12*s* 6*d*

This, the third edition of the book which originally appeared in 1924 under the name of Charles Schuchert, has been based mainly upon a larger volume prepared by Charles Schuchert and Carl O. Dunbar in 1933, and in its rewritten form appears almost as a new book. It can however only be regarded as an introduction to historical geology, as is emphasized by the authors in their preface.

An absence of unwieldy detail not only makes pleasant and easy reading but also enables a better appreciation of the evolutionary trend, both physical and biological, to be obtained. The latter is also achieved by an interesting arrangement of well-chosen material. A general introduction in Part I, which includes many aspects of the evolution of geological thought, is followed in Part II by a consideration of the physical history of the Earth; examples, for the major part, being drawn from North America. Part III deals with the evolution of life, and the book is brought to a conclusion with a chapter on Man; this includes a summary of the evidence for the antiquity of man in North America. The book is well illustrated both pictorially and diagrammatically, and most of the sections have small inset maps to indicate the line of section.

Since the physical and biological aspects are separate and examples in the former are mainly from North America, this book may be especially recommended to the geomorphologist as providing, preferably with an English work on historical geology as a companion volume, the geological background so necessary for a true appreciation of his subject. W. G. V. B.

LEHRBUCH DER METEOROLOGIE. By [JULIUS] HANN. Fünfte vollständig neuarbeitete Auflage . . . herausgegeben von R. SÜRING. Erste Lieferung. *Leipzig: Willibald Keller*, 1937. $10\frac{1}{2} \times 7\frac{1}{2}$ *inches;* 1–96 *pages; diagrams. M.*8.80 (*by subscription M.*6.60)

This is the first of the fifth edition of Julius Hann's well-known work, thoroughly revised by Dr. Süring and his collaborators. It deals with the composition and physics of the atmosphere, radiation, the stratosphere, ionosphere, and kindred subjects, and includes a wealth of tables and diagrams. The opening sentence: "Die Meteorologie ist die Lehre von den Erscheinungen in der Lufthülle der Erde und in obersten Bodenschichten" is an improvement on earlier definitions which omit reference to the uppermost layers of the soil. In the presentation of new data relating to atmospheric conditions, the theory of which is involved or in an unsatisfactory state, sufficient care has unfortunately not been taken to guard the student from perplexity. An example of this is seen on pages 53 to 55 in the tables and diagrams relating to the Linke turbidity factor (*Trübungsfaktor*). It is explained that atmospheric turbidity depends among other factors on dust-content, vapour-content and turbulence, and in conformity with this a number of places in different parts of the world show a higher factor in summer than in winter. The characteristic is shared prominently by Kew; yet the fact will be completely unintelligible to any reader familiar with the much greater transparency of the London air in summer than in winter, unless it should dawn upon him that the "turbidity factor" may not be a simple conception, or he happens to know that the theory of the subject is still very unsatisfactory. L. C. W. B.

DEUTSCHE ATLANTISCHE EXPEDITION AUF DEM FORSchungs- und Vermessungsschiff "Meteor" . . . 1925–1927. Wissenschaftliche Ergebnisse. Edited by ALBERT DEFANT. Band VI. Erster Teil (with title-page, contents and binding-case, to complete), Schichtung und Zirkulation des Atlantischen Ozeans. Dritte Lieferung, pp. iii+289–411. Die Troposphäre. By ALBERT DEFANT. *Maps and diagrams.* [Separate] Atlas, pp. vii and Beilage I—CIII. By G. WÜST (Teil A u.B: Stratosphäre) and A. DEFANT (Teil C: Troposphäre). *Berlin: Walter de Gruyter & Co.*, 1936. $11\frac{1}{2} \times 9$ *inches. M.*33 (*exc. Atlas*)

According to Professor Defant's definition the oceanographic troposphere is the upper, warmer, and salter layer of the sea, which stretches from polar front

to polar front between lat. 47° S. and lat. 55° N. It is separated from the colder and less saline stratosphere below it by a poorly marked discontinuity which cuts the surface at the fronts, sinks to 600 m. and 700 m. in lat. 20° S. and lat. 30° N., and rises to about 300 m. in the equatorial regions. Wüst has shown that this boundary coincides approximately with the surface of minimum oxygen and of 8° C.; off the Strait of Gibraltar the 8° isotherm lies deeper.

The surface of the sea is heated by the sun, and the resulting high temperature and low density are carried down by turbulence until the difference of density against the underlying cold water is so great that no further mixing can take place. Then in the region free from regional change, between approximately lat. 20° N. and lat. 25° S., a covering layer (*Deckschicht*) of uniform temperature and density is formed, which is separated from the colder water by the tropospheric discontinuity (*Sprungschicht*) in which the temperature changes rapidly; according to the author's definition the change is not less than 0·02° C. per metre. The depth of the discontinuity increases from east to west and from the equator polewards; a meridional section shows a double hump with minima of depth on the equator and in lat. 10° N. This want of symmetry is due to the fact that, while the effect of rotation is symmetrical about the equator, the equatorial currents are arranged unsymmetrically. The existence of the counter current is probably due, at least in part, to the same cause, and both effects may be referred to meteorological conditions.

The salinity often shows a remarkable distribution. In many regions there is at the under side of a homohaline covering layer a maximum of salinity, due to an outflow from the base of the great subtropical accumulations of water of high salinity, which themselves show no maxima.

There are eighteen coloured plates of charts and sections and many figures in the text which illustrate the details of structure as well as the actual distribution of temperature and salinity. Other plates referring to the upper 500 metres of the troposphere are bound up at the end of the atlas.

The Atlas is a beautifully printed collection of coloured plates. The first part, by Dr. Wüst, contains 15 plates which show separately the temperature, salinity and density under atmospheric pressure from surface to bottom along 23 sections. They are founded almost entirely on the *Meteor's* work, but observations by other ships have been used for the bottom. The second part, also by Dr. Wüst, contains 45 charts showing the same quantities at 15 standard depths, from 200 m. to 500 m. The value of these would have been increased if the three mean surface charts by Dr. Böhnecke had been included. There is also a revised and simplified bathymetric chart.

Many of the conclusions arrived at by the authors in these two volumes have been questioned by others, but this detracts nothing from their great value.

D. J. M.

ECONOMIC AND HISTORICAL GEOGRAPHY

LIMITS OF LAND SETTLEMENT: a report on present-day possibilities. Prepared under the direction of ISAIAH BOWMAN. *New York: Council on Foreign Relations* (*United Kingdom: The Royal Institute of International Affairs*), 1937. 9½×6 *inches;* viii+380 *pages; maps.* 15*s*

This timely study of land settlement is essentially a geographical analysis. Written mainly by geography specialists, it indicates, but does not attempt to treat exhaustively, the political, strategic and economic factors which often almost completely override and obliterate purely geographical factors in governing human affairs. Save that they necessarily assume a capitalist framework for society, and hence make monetary profit rather than human welfare

the criterion of successful settlement, the viewpoint of the nine authors is as detached and dispassionate as possible. Dr. Bowman inevitably feels more strongly convinced than, say, a French writer would do, that the assimilation of immigrants to the general Brazilian population with its marked strain of dark blood is a drawback and deterrent to settlers, in spite of the fact that from other points of view Brazil seems a more hopeful theatre for new settlement than almost any other. Mr. Owen Lattimore, too, lets his preconceived notions get the better of him when he cites a few insignificant, and even fallacious, exceptions to disprove the generally accepted thesis that peoples will migrate most freely and successfully into areas where geographical conditions allow the minimum disturbance of their traditional economy: a thesis which is neatly illustrated by the distribution round the Mediterranean Sea of ancient Phoenician and Greek colonies. But such departures from strict objectivity must be carefully searched for; the book has no propaganda motive, and all its statements are carefully documented.

About its conclusions there is nothing startling. Broadly speaking, the days of great migrations are over, and this for two reasons: the best lands have, with few exceptions, already been taken up; and the general rise in the standard of living in the overcrowded countries of the world precludes the modern pioneer from accepting deprivations and hardships to which his prototype of early days was, at least in part, accustomed in his home country. Moreover, in many countries there has now been established a minimum standard of public services, and the cost of extending them into new and perhaps very scattered settlements is a serious consideration. The wisest policy appears to be to devote public money to improvements which will allow of the filling up of the interstices of present-day settlement. Certainly nearly all recent attempts to provide capital at the taxpayers' expense for placing families on hitherto unoccupied lands appear to have ended disastrously, though faulty (and especially non-geographical) planning and administration, and the unwise choice of settlers are largely responsible. There is need for a much closer study of areas in which, under contrasting conditions, rapid and relatively successful new settlement has been achieved. There are probably few who are aware of the remarkable movement into southern Chile in recent years. There are also the privately owned colonies of hand-picked settlers in north-eastern Argentina, and the new Jewish colonies in Palestine, backed not only by capital but by business heads.

Only in Africa does the question of settlement of white people among aborigines really arise on a large scale, and there also the problem of endemic diseases is at its gravest. South America however presents, to some extent, the problem of the native, or perhaps, more specifically, the problem of two widely separated cultural levels. Dr. Bowman instances, for example, a case of successful pioneering settlement by Spaniards based on a type of exploitation of the aborigines to which an immigrant from one of the democratic countries could not lend himself.

The monsoon lands of Asia, with their land-hungry peoples, have their obverse in the monsoon lands of Australia kept empty by the White Australia Policy. Strategic considerations seem likely to compel the reopening of a question which most Australians consider to be definitely closed. If Darwin is to be a military base, the district ought to be effectively occupied and agriculturally developed. Yet how can this be done on a large scale by Australians in the absence of any labouring population?

Professor Griffith Taylor adheres to his view that the main pattern of settlement in Australia is already established, and that population growth at the existing cultural level must be accommodated within the existing settlement

belts. Side by side with this conclusion may be set that of Professor Carl Sauer, in his introductory essay: "If the European can deal freely and amicably with the rest of the world, he is in the best position to do so in his own land. If he sees the advantages to himself of the greatest possible national relaxation of barriers, Europe is perhaps of all parts of the world the best suited to support a larger population."

Is monsoon Asia, too, best suited to support more than half the population of the world? Certainly it has its thinly peopled as well as its crowded regions. But Mr. Lattimore and Mr. Chen Han-seng alike point out that it is control of capital and not human necessities that directs the streams of migration: conditions well-nigh intolerable are being intensified by administrative action which in the name of nationalism is closing former outlets in Siam and the Dutch Indies. "Political obstruction" (writes Mr. Karl Pelzer) "has so far been the main obstacle to Japanese migration in the Pacific beyond the areas of Japan's political control." In the East Indian and Pacific islands, great and small, are vast unused areas whose development would alleviate Asiatic population problems. Furthermore, as Mr. Pelzer points out, "The American position in Hawaii has not been endangered by the presence of 150,000 Japanese who have contributed most successfully to the economic development of the island group." In Russia the experiment is being made of a planned social system within which 170 million citizens will "live well" off their own country. It remains to be seen whether the experiment will succeed. Nowhere is the problem one of insufficiency of geographical resources, as this book abundantly shows. Somewhere in the structure of human society lies the defect, and as such it is in the long run remediable. E. G. R. T.

GENERAL

LEHRBUCH DER ORGANISCHEN GEOGRAPHIE: Vorschule und Einführung in das Studium. By EWALD BANSE. *Berlin: Walter de Gruyter & Co.*, 1937. 10×6½ *inches;* x+626 *pages; diagrams and maps. M.*18

Ewald Banse is the leader of a band of German geographers placing nationalism above science. Since 1932 his writings have assumed the tone of the prophet once despised but now justified; and the polemical works produced during the unfriendly "liberal" period have been followed by a large treatise expounding the new and officially recognized geography to the students of Germany.

The new method is set forth at some length in the early chapters. Under the heading "Clarifying of basal concepts," on p. 4, the following passage occurs: "Our world outlook must be freed from the lack of a viewpoint characterizing it since the French Age of Reason of the eighteenth century, and must take up an immovable stand comprehending the true people and its destiny. This viewpoint is founded not so much on intellect as on feeling—a feeling our people must manifest uncompromisingly, without intellectual questionings or hesitations as to the rightness of the viewpoint." On p. 15 the subject is taken up again: " The mechanistic-analytical approach necessitates a severance (of geography) into Nature and Man, because Race is not given its rightful place, and thus the only possible bridge between the two is not utilized. It treats of land-forms, hydrography, plants and animals as Nature; and of Mankind by distribution, statistics, settlement and economy instead of by Nations. And in spite of every effort, it is impossible to bring these opposites into union. But when Nature is sublimated into Landscape and Population into a People, and the concept of Blood and Soil is inserted between them, we have dovetailed the two, and have made possible the closing of the gap or caesura between Earth and Man."

Needless to say, the new geography calls for new methods of study: "Gazing (*schauen*) is the first and most important means of study, by which the geographer seeks to apprehend the wholeness of his subject. The greatest of all assets is the vision which surveys with wonderment a new landscape, receiving an impressionist image of light and shade, colour and movement, of principal features in outline. This first impression gives a lead to the sensitive observer of this landscape or group of landscapes, since it strikes the key-note, *i.e.* the feeling which the sight of the landscape arouses in the soul of the observer, and the harmony or disharmony which exists between the two. The landscape stretches out before the gazing man like a picture on display, to be minutely scanned. He must open his eyes again after the first impression (which may be tedious and disillusioning, stimulating and uplifting, cheering or depressing), and address himself to further observation, thus passing from gazing to the will to understand. Feeling predominates no longer; but plays its part with the search after order, and the striving to reach aesthetic and scientific knowledge of the principal features. . . ." (p. 12).

A substantial amount of space is then devoted to Landscape, *i.e.* physical geography. The German convention in treatises is very plainly manifested. It is a literary exposition of principles, illustrated by occasional diagrams. In its lack of vitality it resembles a dull class-room exposition, and one wonders how a student could want to go to the field and discover things for himself. In the reviewer's opinion, the French and American tradition of describing leading regional types, with the aid of numerous maps and illustrations, is educationally far more valuable. There is more reality to the subject, and the risk of acquiring superficial ideas through the study of over-generalized statements and diagrams is avoided. (Figs. 209–210, portraying the distribution of temperature over land-masses and oceans, are examples of such dangerously over-generalized diagrams, and there are others.) A novel feature of this section is the attention given to the relation of topography and climate to military and naval operations.

Last of all, the subject of Landscape and Man is treated. Race, Nationality and State are the principal subdivisions; and there is much controversial matter. Race and Nationality are defined with tolerable correctness, and the generally accepted classifications and distributions of major races and nationalities are adopted. Nevertheless, an altogether exaggerated prominence is given to the Germans. On the map (Fig. 241) showing the distribution of cultures North America and Australia are indicated as the chief non-European lands to which "Germanic" culture has spread. It is frequently asserted and implied that the Germans represent the highest culture of Central Europe.

There can be no doubt of the cleavage between Professor Banse's geography and academic geography in other western countries. In France, England, and America geographical research, investigating the true nature of the bond between societies and their habitats, has neglected political geography. The state is deemed an ephemeral and unstable terrestrial unit, and by no means the most fundamental territorial aspect of societies. It is felt that more real and permanent units than the political may be found at the root of geographical studies. But in Germany political geography has always received more attention. The relations of the state and its development to its territory, of its military and economic strength to its resources and population, and of its foreign policy to its geographical position, are all under constant review by German university geographers. New books have been constantly forthcoming, especially in the last five years. J. H. G. L.

THE MONTHLY RECORD

AWARD OF THE GEOGRAPHICAL ESSAY PRIZE

In 1933 the Council of the Society resolved to offer a prize of Ten Pounds annually for an Essay of not more than 5000 words: either a critical survey of recent additions to knowledge in a limited geographical field selected by the writer or a discussion of some current problem in its geographical aspects. Competitors for the prize must be registered Internal or External Students reading for Honours in Geography at one of the universities of Great Britain and Northern Ireland during the academic year within which they submit their essay. The original time for submitting essays was the month of December, but in response to a request from university students the date has been extended in order to include the university vacation at Christmas. The award is made not later than March 31, and the Prize Essay is published in the *Geographical Journal*. Photographs, sketch-maps, and diagrams should be restricted to the minimum essential to illustrate the essay.

Four essays were submitted in 1937, and the prize was awarded to Mr. Eric Charlesworth (Jesus College, Oxford) for his essay on 'A local example of the factors influencing industrial location,' which will be published in a forthcoming number of the *Journal*. The examiners were of opinion that the essay by Mr. J. T. Gleave (Durham) on 'Tees-side iron and steel industry' is also worthy of publication.

Essays in competition for the Sixth Award of the prize should be addressed to the Secretary of the Society by 20 January 1939.

PUBLICATIONS OF THE ORGANIZING COMMITTEE OF THE XVIIth INTERNATIONAL GEOLOGICAL CONGRESS, MOSCOW, 1937

The great activity of Soviet geologists has made possible the production of a geological map of the U.S.S.R. on the scale of 1 : 5,000,000, a copy of which is now in the Society's map-room. It is on a conical projection, in eight sheets of about 54 × 42·5 cm. inside measurement, and as an example of colour printing can bear comparison with the finest work of other countries. By ingenious combinations of colour and pattern no less than 77 geological formations are distinguished by characteristic tints.

Twenty-five guide-books were issued in connection with the excursions organized for members of the Congress: all but five of these are now in the Society's Library. They vary in size from 52 to 140 pages, and in price from 1 rb. 75 to 3 rb. 50, and are either in English or French. Nearly all contain a number of folding maps and sections, and about half contain one or more passable half-tone plates, and the number of text-figures averages 15. The plans of the several books vary considerably, but in general there is an introductory physiographical, historical, and economic account of the district traversed, followed by more detailed accounts, mainly geological. We give a brief annotated list, in geographical order.

Northern Excursion. Two booklets: Karelian A.S.S.R.—the course of the Kirov [Murman] railway from Lake Onega to Kandalaksha, mainly crystalline rocks; Kola Peninsula—also crystalline rocks, with the world's largest apatite deposits.

Novaya Zemlya. Two booklets: general and routes. Mainly folded Palaeozoic rocks.

Permian Excursion. Two booklets: Northern—mainly undisturbed Palaeozoic

rocks; Southern—crystalline, Palaeozoic and Mesozoic rocks, with the mineral wealth of the Ilmen Mountains, Magnitogorsk iron-ores, Chelyabinsk coalfield, etc.

Uralian Excursion. Two booklets: Northern—basic crystalline rocks, with gold, platinum, chromite, magnetite, etc.; Southern—identical with Southern Permian.

Excursion Sibérienne. Three booklets describing three sections of the Siberian Railway: Oural—Perm to Sverdlovsk [Yekaterinburg]; Sibérie Occidentale—Sverdlovsk to Achinsk, with the great Kuznetsk coalfield; Le pays de Krasnoïarsk—Achinsk to Nijni-Udinsk, with a journey along the Yenisei gorge to Minusinsk.

Moscow Coal-Basin. One booklet: Carboniferous rocks between Podolsk and the Upa valley south of Tula.

Southern Excursion. Three booklets: Donetz Coal-basin; Ukrainian S.S.R.—varied geology, with iron and manganese ores and the Dnieper hydro-electric station; Crimean A.S.S.R.—Mesozoic and Tertiary of southern coast.

Excursion au Caucase. Five booklets (not in the Society's Library): Rostov-Tbilissi [Tiflis]—traverse by Georgian military road; Chaîne principale et Parc National; Littoral de la Mer Noire; R.S.S. de Géorgie—partie occidentale; R.S.S. d'Arménie—a volcanic region.

Petroleum Excursion. Five booklets, with much information on Tertiary stratigraphy and tectonics, as well as on oilfield economics: the Permian Prikamye, Bashkirian S.S.R. (Ufa district), and the great Samara loop of the Volga; Azerbaijan (Baku); Grozny area, west of Caspian Sea; Georgian S.S.R., oilfields around Tiflis; Kuban–Black Sea oilfields. A. M. D.

HYDROGRAPHY OF NORWEGIAN FJORDS

Under the title "Land-locked waters. Hydrographical bottom deposits in badly-ventilated Norwegian fjords. With remarks upon anaërobic conditions" Mr. Kaare Münster Strøm describes hydrographical investigations in some thirty Norwegian fjords between Oslo and Sognefjord carried out during the summers of 1932 and 1933. ('Skrifter utgitt det Norske Videnskapsakdemia i Oslo, 1936.' I. Matem. naturvid. Kl., I Bind, 1937.) Although a good deal of work of the kind has been done on the fjords since it was realized that these waters present analogous conditions to the Black Sea and other seas, no detailed research has hitherto been undertaken respecting the stagnation processes and accumulation of sulphuretted hydrogen gas. In the region surveyed there are a large number of basins with shallow thresholds which are quite typical of recently glaciated regions. The deep waters of these basins do not get thoroughly ventilated by water that has been in contact with the atmosphere, partly because they are not completely flushed out by the tides and partly because they are overlain by lighter, warmer or more saline water. Hence the bottom water becomes foul and unable to support life, and the constant rain of dead organisms from the fresh waters above aids in the formation of black mud with evolution of sulphuretted hydrogen. It sometimes happens that a salt-water fauna leads a precarious existence between the sterile deep water and brackish surface water. Partial ventilation of the deep water is commonly effected by convection currents set up through a rise of temperature in the depths.

It is found that temperature in the depths is fairly constant for each fjord, but is rising during the latter part of stagnation periods and falling again when partial or total ventilation is caused by cold waters entering over the threshold. Salinity in the deep water is very constant in the fjords surveyed, rarely varying more than between one-half and one per mille in each fjord. There seems to be

a limit to the amount of sulphuretted hydrogen that accumulates in the depths, depending on the degree of stagnation, which is very rarely complete. Two fjords showed a maximum H_2S content of about 40 c.c. per litre.

The writer concludes with a discussion of geological questions arising from the similarity between the muds being formed in land-locked waters to-day and the black graptolite shales of Ordovician times. It is pointed out that parts of the Atlantic are poorly ventilated even to-day and that there is a good deal of evidence for stagnant conditions during geological ages of more equable climate over the globe and less vigorous oceanic circulation.

THE GEOLOGY OF NORTHERN CENTRAL AFRICA

Dr. Sandford has done students of African geology a material service by summarizing, in the light of his own experience, a voluminous literature for a not inconsiderable part of that continent. In "Observations on the geology of Northern Africa" (*Quart. Jour. Geol. Soc.*, 93, 1937), he deals with the history of the Sahara, the west coast of Africa as far south as the Belgian Congo, and the valley of the Nile. Incidental reference is made to South and East Africa. From the geographical standpoint the Eocene transgressions, former lake basins, and accompanying volcanic activities are of the greatest importance. The commencement of the last continental phase was marked by a "general elevation with strong differential movement," Alpine folding of the Atlas and severe fracturing. This followed the Cretaceous–Eocene marine invasion which reached to the south of the Tanezrouft and the Chad–Benue region and marked the conclusion of the preceding marine period. Retreat of the Eocene sea, except in Libya-Egypt and the formation of inland basins about the Nile, Chad, Niger, and Congo followed and were again succeeded by elevation, rifting, major faulting, extensive vulcanism and denudation. Maps illustrate a paper which one wishes were longer, for an immense amount of information is crowded into a small space. A bibliography containing the names of over sixty authors will aid those who wish to pursue the subject further. J. P.

A PROBLEM IN JUBALAND

We have received from Dr. John Parkinson a letter dealing with the note which was published in the *Journal* for January (p. 92) under the above heading. In 1915 he visited the Wajheir district in Kenya *via* the Lorian Swamp (*Geogr. J.* 73 (1929) 300), and found conclusive evidence that the wells and the dams which formerly existed were necessitated by desiccation. The narrow Wajheir wells are excavated in freshwater limestone, the lake in which this was formed being the original source of supply. As it dried wells were sunk in the bed, while others outside the Wajheir district were tunnelled downwards on the sites of former springs. The dismantling of one of the numerous cairns, which contained human and other bones, disclosed nothing of interest except a piece of sheet copper bent into the shape of a tube about 2 inches long. A similar tube was found in a cairn opened by Dundas.

These cairns recall similar piles of stones common in parts of British Somaliland. Dr. Parkinson calls attention to an account of ruined cities in Somaliland by Captain A. T. Curle, published in *Antiquity* for September 1937. These are found in the interior on the Abyssinian border south of Zeila. Examination shows that they are the remains of a Muhammadan civilization which flourished in the fifteenth and sixteenth centuries. Dr. Parkinson believes that failure of the rainfall led to the abandoning of these once-flourishing cities, and suggests that this desiccation may have been contemporary with that which caused the exodus from the Wajheir district in Kenya. Bendiger, the site described by

Colonel Hill, may form a link between the two regions. Little evidence has yet been obtained, such as stone grinders or stone pots. In Somaliland Dr. Parkinson found many specimens of grinders which are occasionally of recognizable petrographical types, indubitably foreign to the neighbourhood. It is possible therefore that the locality from which these rocks were obtained may be recognized, and a point on the southern migration of these peoples be thus established. In Western and Central Somaliland grinders of a grey vesicular lava had been left in five widely separated places, and the nearest locality from which they can have come is on the Abyssinian frontier in the extreme west of British Somaliland.

It would be interesting if a connection between these two cultures could be established. The people of northern Somaliland however appear to have formed almost entirely settled and commercial communities, while those of northern Kenya were pastoral nomads.

METEOROLOGY OF FRENCH WEST AFRICA

A volume entitled 'Études météorologiques sur l'Afrique Occidentale Française' contains articles by several authors on the meteorology of French West Africa, including the *harmattan* wind, hail, and sandstorms [*Publicns. Comité d'Études Histor. et Scient. de l'A.O.F.*, Série B, No. 3].

The harmattan is an intensely dry dusty desert wind of considerable strength which blows from the east. In winter it frequently reaches the Guinea coast, but in the northern part of the French Soudan it is the predominant wind at all seasons, and is always to be found blowing at upper levels. Where it comes in conflict with the South-West Monsoon, as near the coast during transition periods between the rainy and dry seasons, tornados and thunderstorms occur. This wind is so dry in comparison with the North-East Trade that it quickly destroys the beneficial effects of the rains on vegetation, and where it is predominant human beings need special types of dwelling, clothing, and even food. At Gao, which lies a little south of the region where the harmattan is predominant, its sudden onset from the heated Sahara brings a sharp rise of temperature and fall of humidity. The vapour pressure has been known to fall as low as 0·1 millimetre and the relative humidity as low as 3 per cent. Although passage across the Sahara desert must maintain the dryness of the harmattan, the real origin of its dryness is the descent from the upper levels of the atmosphere where the temperature is too low for the air to hold much moisture.

Sandstorms occur throughout the year in the arid regions but are most frequent during the hot months when they may accompany thundery squalls or tornados. One such squall which struck Kidal on 3 June 1933 was intensely dark and opaque, the range of visibility for ten minutes being reduced to 5 centimetres. This evidently exceeds the opacity of a really dense London fog.

Hail is described as a lesser scourge in West Africa than in France and other European countries. This is because the high temperature causes so much of it to melt before reaching the ground in low country. Thus at St. Louis it has only been observed once in a period of fourteen years. In the more elevated and mountainous districts however hailstorms are quite common partly because of the lower temperature and partly because of stronger convectional circulation over areas of bold relief. As in temperate climates, hail is highly localized even within the local thunderstorms in which it commonly occurs. In French West Africa hail is reputed to show a predilection for places where the soil is radioactive and the rocks are granitic, siliceous, or ferruginous. It may be noted in this connection that in some countries places of this character have been shown to attract lightning, so that the relation to hail may be only incidental.

THE BOSUMTWI CALDERA

The Bosumtwi caldera, a saucer-shaped depression south-east of Kumasi, containing a lake nearly 50 square miles in extent, has for long been the subject of controversy. It has been ascribed to volcanic activity, to subsidence, meteoric impact and explosive action. To the native inhabitants, it is sacred.

Dr. Junner, in this latest communication (Gold Coast Geological Survey, *Bull.* No. 8), writes what must be regarded as the final word. Accumulated evidence points to an explosion crater or caldera, and the Director of the Survey comes to the conclusion that the "gases and vapours" which drilled the "funnel-shaped hole" through the overlying cover were products derived partly from "an uprising buried igneous mass" and partly from the water contained in the surrounding strata. These, thrust upwards under the stress of the expanding gases, gave way and the caldera was formed. In time the column of solidifying magma cooled and subsided and the central part of the crater itself being unsupported settled downwards. D. P. Macgregor gives the results of a hydrographic survey, and Dr. Errol White contributes an appendix on the fossil fishes, collected from the lake terraces. J. P.

LAND UTILIZATION IN TASMANIA

W. H. Maze and A. G. Lowndes in "Land utilization regions of Tasmania" (*University of Sydney Publications in Geography*, No. 4), give the results of a reconnaissance survey accompanied by a map in colour on a scale of 1 : 650,000. From the map the concentration of the farming activities on the south-east and northern coastlands is readily seen and also the startlingly large extent of the waste land, the latter coinciding with what the authors term "mountainous land-forms," *i.e.* land 1000–3000 feet high with frequent slopes of 25° and even 35°. In 1933–4 the area under crops was but 1·7 per cent. of the total area of the island; of the products horticulture occupied 12·3 per cent. of the cropped land but produced 42 per cent. of the gross crop value. The question of aspect and slope has been studied in detail and it is shown that the apple orchards, the principal crop, occupy gently sloping land in the lower parts of the valleys and that easterly or northerly aspects are the most suitable. While the acreage under apples has not increased, the yield per acre has risen. Other products are hops, grown on irrigated lands in the Derwent valley, and small fruits, such as raspberries, grown on the hills of the south-east and forming the basis of the jam industry of Hobart. Other types of utilization established by the authors are: agriculture, which is subdivided according to the dominant crops; permanent pasture, typical of the Midlands and Derwent valley and associated with the high-quality wool; summer grazing in the area of the Central Plateau, between which and the Midlands transhumance of sheep takes place; sparse grazing and timber, forest lands and finally waste lands.

The general account of the land utilization is illustrated by dot maps of potatoes, oats, wheat, peas (by acreages) and sheep, and all maps serve to emphasize the concentration of agricultural activities along the north and south-east coasts with extensions inland along the Tamar and Derwent valleys. Three detailed areas of study are used as a preliminary to a more detailed view of the economy of the island as a whole and these studies are accompanied by maps of both land utilization and slope, showing that while slope is not the sole factor it is extremely important in Tasmania. Finally the report has a number of photographs illustrating the various types of land utilization as established by the authors. A. C. O.

SLOPE AND SOIL EROSION

Much attention has recently been given to the proper utilization of soils to avoid needless damage by careless cropping. Mr. R. M. Glendinning in his paper "The slope and slope-direction map" (*Michigan Papers in Geography*, VII, 1937, pp. 359–64), demonstrates a convenient cartographic convention for mapping slope in connection with land utilization and soil maps. The area used for demonstration is divided into zones of slope of from 0–5 per cent., 5–10 per cent., etc., and in these zones arrows are placed to indicate the fall of the land, thus giving the waterflow direction. On the map it is possible to mark the land utilization verbally and to show by shading areas of erosion, and so to correlate degrees of erosion with both slope and utilization. Professor J. M. Holmes ("The growth of soil on slopes," *Proc. of the Linnean Society of New South Wales*, LXII, 1937, pp. 230–42) deals with the less mature soils of eastern Australia, particularly with those of the Tamworth District of N.S.W., and shows how there is on the valley sides a marked differentiation of characteristics and that soil changes frequently coincide with breaks of slope. The angle of slope controls the rate at which soils mature from the country rock and in eastern Australia the steepest slopes have the least mature soils. With an angle of more than 10 degrees there seems to be a permanent immaturity which can be recognized by the indefinite cross profile and a marked rocky characteristic due to the mobility of material; while at the other end of the scale slopes of less than 2 degrees tend to have mature soils with a very high clay content. With flood plain deposits however the clay content is frequently very low indeed.

In the *Geographical Review* for January Dr. R. M. Gorrie deals with the problem of slope and soil cover on a larger scale, and his well-illustrated paper shows the effect of too intense settlement in the foothills of the Punjab. The close connection between surface cover and run-off is shown by the measurements of the peak run-off in the Pabbi Hills region near Jhelum.

In an area adequately protected by afforestation and erosion control, the run-off is 100 cusecs per square mile; in an area with controlled grazing, 600 cusecs per square mile; and in an area with ineffective grazing control, 1000 cusecs per square mile. For an area overgrazed and thus covered with shifting sands, the run-off reached 1600 cusecs per square mile, *i.e.* 90 per cent. of the total precipitation.

As a result, also, of inadequate agricultural technique among the more primitive hill communities, tiny fields are cultivated without proper terracing, and here up to 200 tons of soil is washed off each acre every year. With such a loss the foothills are being rapidly denuded of the fertile soil and the pressure on the land to support the increasing population becomes more severe.

A. C. O.

TERRESTRIAL AND CELESTIAL GLOBES BY WILLEM BLAEU

Through the courtesy of Mrs. Baillie Grohman, a pair of terrestrial and celestial globes by Willem Jansz Blaeu have been placed on exhibition in a glass case in the new Map Room. The globes, 34 centimetres in diameter, are mounted on oak stands, which may in part be contemporary, with brass meridian circles. The terrestrial globe bears a dedication to the Lords of the United Provinces, signed Guilielmus Ianssonius Blaeu, with the date 1599 below. This was the date of the original publication, for a second inscription states that the globes and spheres of the "Heer Joan Bleau" are sold by Joannes van Ceulen, of Amsterdam, and this is dated 1682. As E. L. Stevenson has pointed out, the delineation and nomenclature of the region around the Straits of Magellan on the globes of this issue embody the results of Schouten's voyage

of 1615–17. This seems to be the latest information incorporated, so that the plates of the 1599 issue were probably slightly altered and reissued about 1620, and then, with the addition of van Ceulen's name, were used unchanged in 1682.

Willem Blaeu died in 1638. The Joan Blaeu of the later inscription was his son, who with Cornelis, another son, succeeded to the family business. This was carried on until a fire in 1672 destroyed most of the plates and stock. It was no doubt soon after this that the plates which were saved were taken over by van Ceulen. The destruction wrought by the fire also explains why the latter should have issued a globe which was at least sixty years out of date, and showed for example none of the discoveries of Tasman. No doubt the later globes of the Blaeu family had perished. The globes of the 1599 issue are rare; as they were little altered subsequently, those of 1682 are valuable to the student of historical geography.

The celestial globe was first published in 1603, and the plates do not seem to have been altered afterwards. If, as is probable, the two globes have always formed a pair, the celestial was printed from the original plates in 1682.

MEETINGS: SESSION 1937–38

Seventh Evening Meeting, 7 February 1938. The President in the Chair

Elections: Mrs. Beatrice Alice Brooks; The Reverend Frederick Henry Jacob Charles Chambers; Miss Theresa Clay; Harold Davies; Mrs. Dorothy Drage, O.B.E., J.P.; Walter John Henry Earl, B.A.; David Tarazi Fisher; Miss Enid Mary Fordham; Mrs. Alison Greig; J. B. Holmes; William Reginald Noel Hughes; Barnett Claude Joseph; Thomas William Karran; Mrs. Walter Lambert; Humphrey David Richard Pelham Lindsay; Major William Morgan Macaw, M.C.; John Mills; Ahmad Mostofi; Captain John R. Noyes; Miss Barbara Prescott; Alvin Pryor, L.D.S., R.C.S.Eng.; Alfred William Richards, M.A., B.SC.; Francis John Rose, B.A.; Dr. Cleveland P. Scott; Robert Edward Oscar Solosth, O.D., OPT.D.; Egerton Sykes; Mrs. Margaret E. Thomson, L.L.A.; Gilbert D. Venables, D.O.; Frank Adolph von Goldstein, B.A., L.C.P.; Miss Felicity Emily Wedgwood; Miss Rosemary Theodora Hamilton Wills; Miss Lillie M. Wilson

Paper: The exploration and ascent of Mount Lucania in the Saint Elias range. By Mr. Bradford Washburn

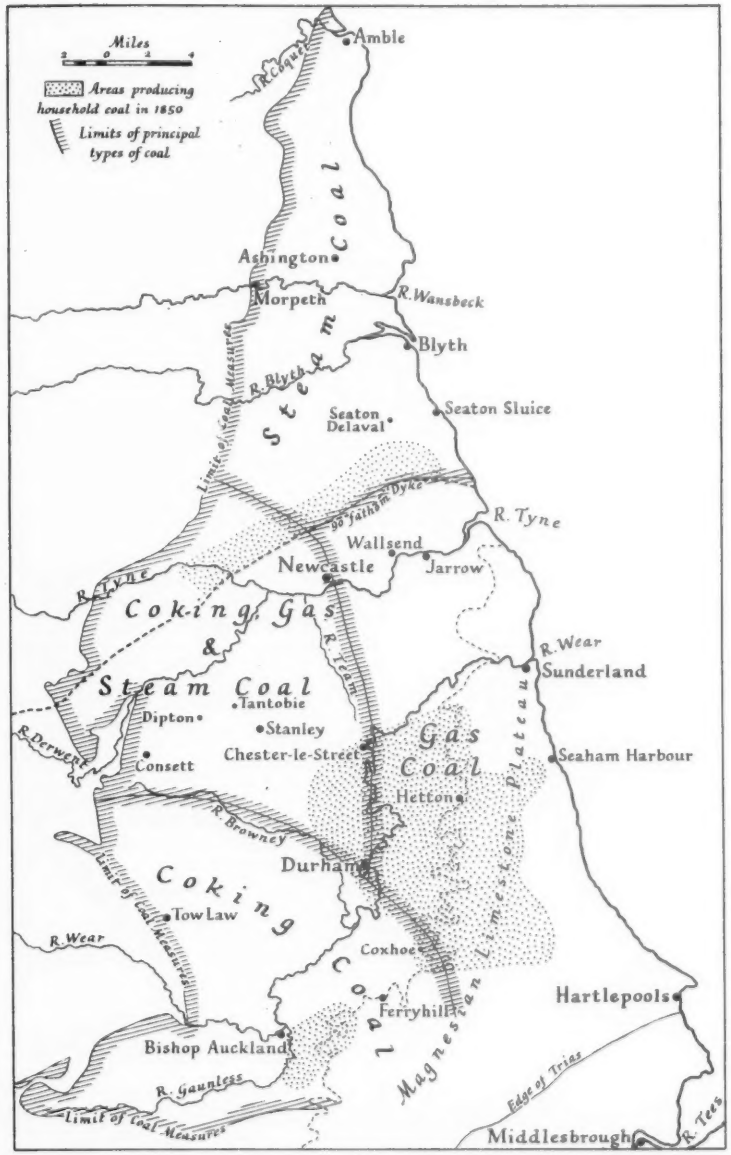
Fourth Afternoon Meeting, 14 February 1938. The President in the Chair

Paper: The structure of the Lower Yangtze terraces. By Mr. John Hanson-Lowe

Eighth Evening Meeting, 21 February 1938. The President in the Chair

Elections: Frederick Walter Bailey; Reynold Jocelyn Onslow Bray; Miss Mary Knight Clowes; The Reverend Frank Coop; Miss Dorothy Dawkins; Lieut. Richard Aylmer Gardiner, R.E.; Edward Glymo Harris; Miss Winifred Jean Howard; Miss Mary B. Kelleher, B.A.; Vernon Cecil Wordsworth Kenyon; John Cowley Britton Kimber; Mrs. T. A. Lambie; Colonel John Francis Terence Patrick Ward-McQuaid; Campbell Secord; Maurice Bensley Thornhill; Richard Gray Worcester

Paper: King George the Sixth Sound. By Mr. A. Stephenson and the Rev. Lancelot Fleming



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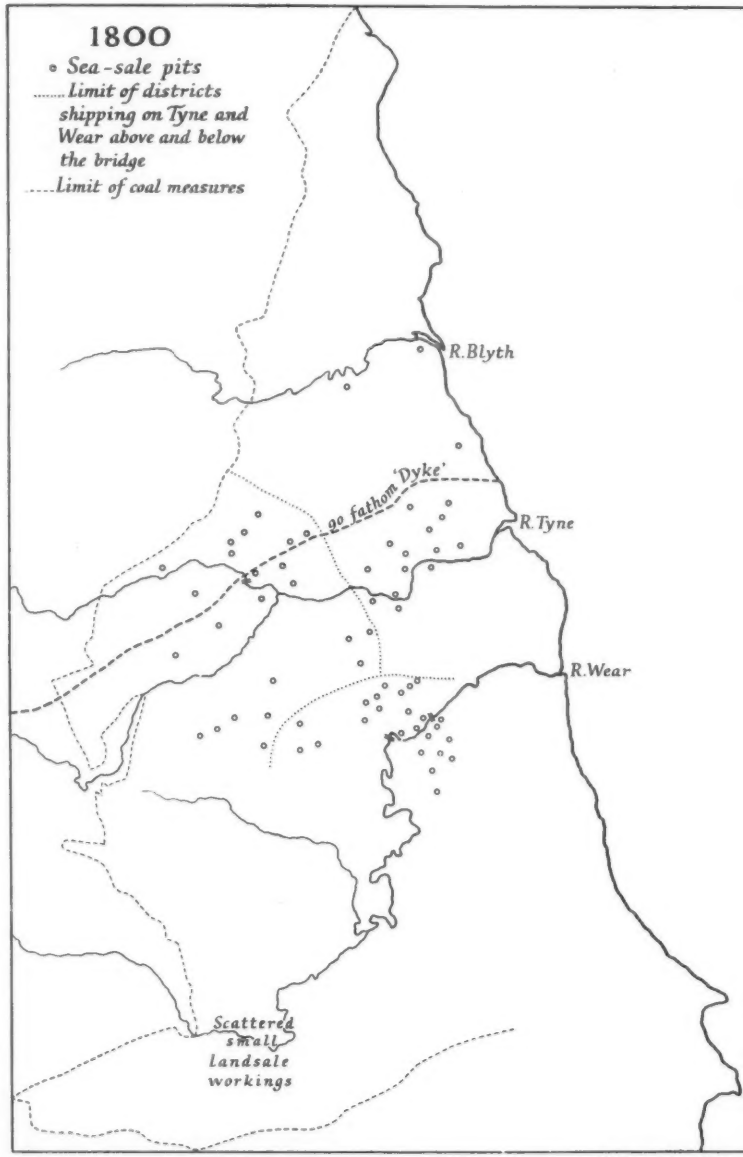

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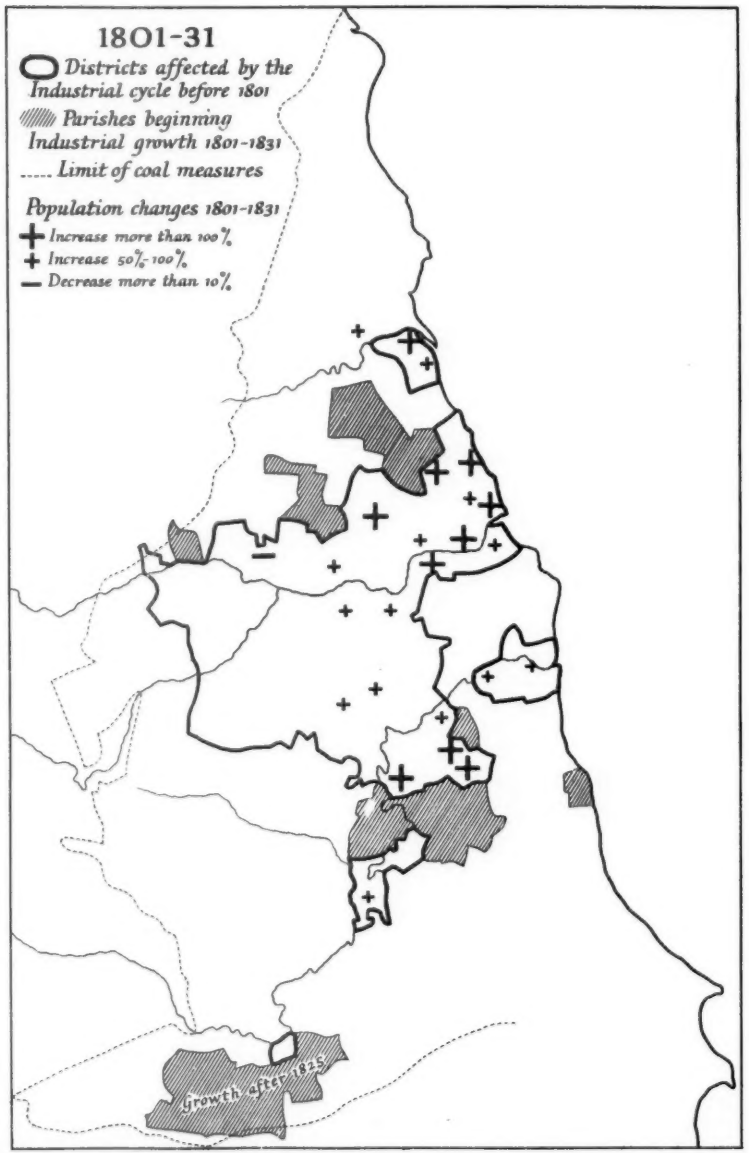

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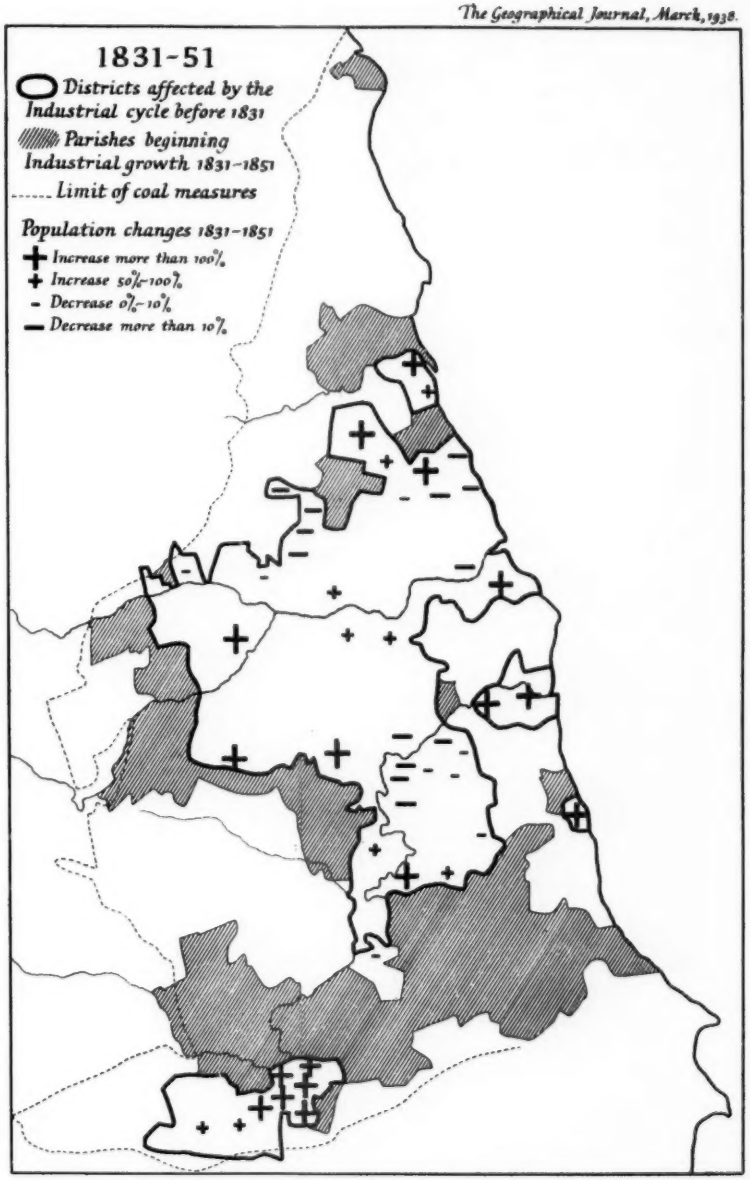

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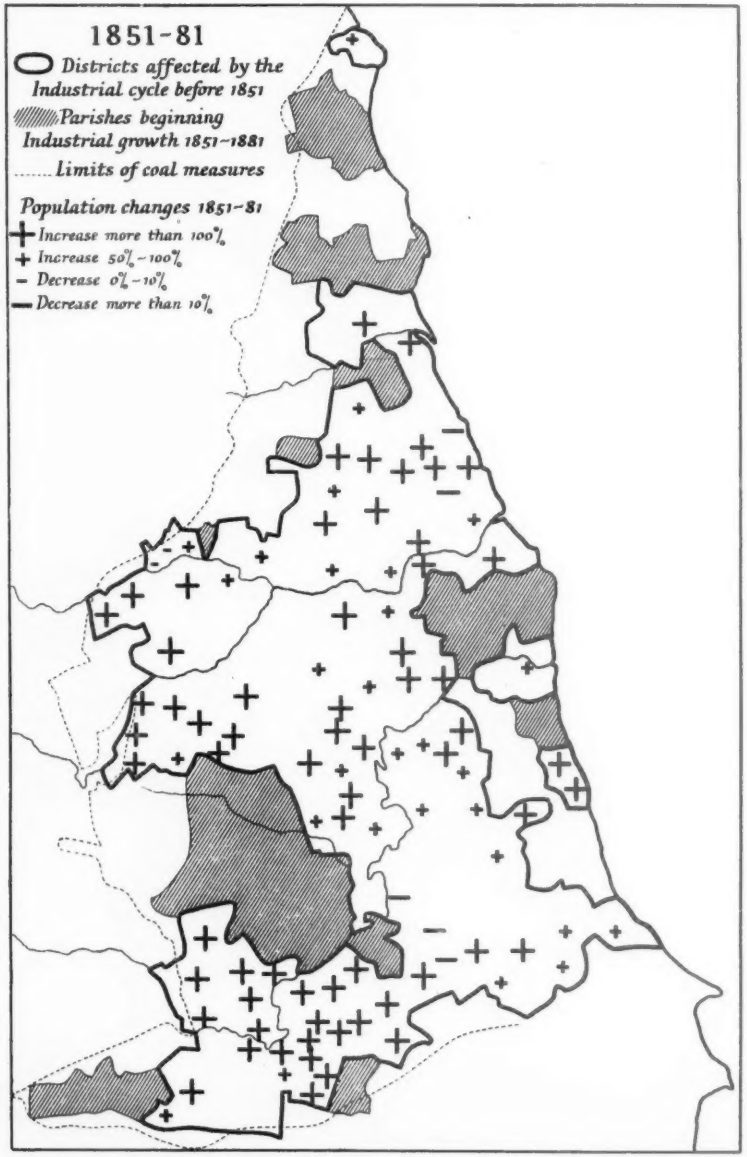
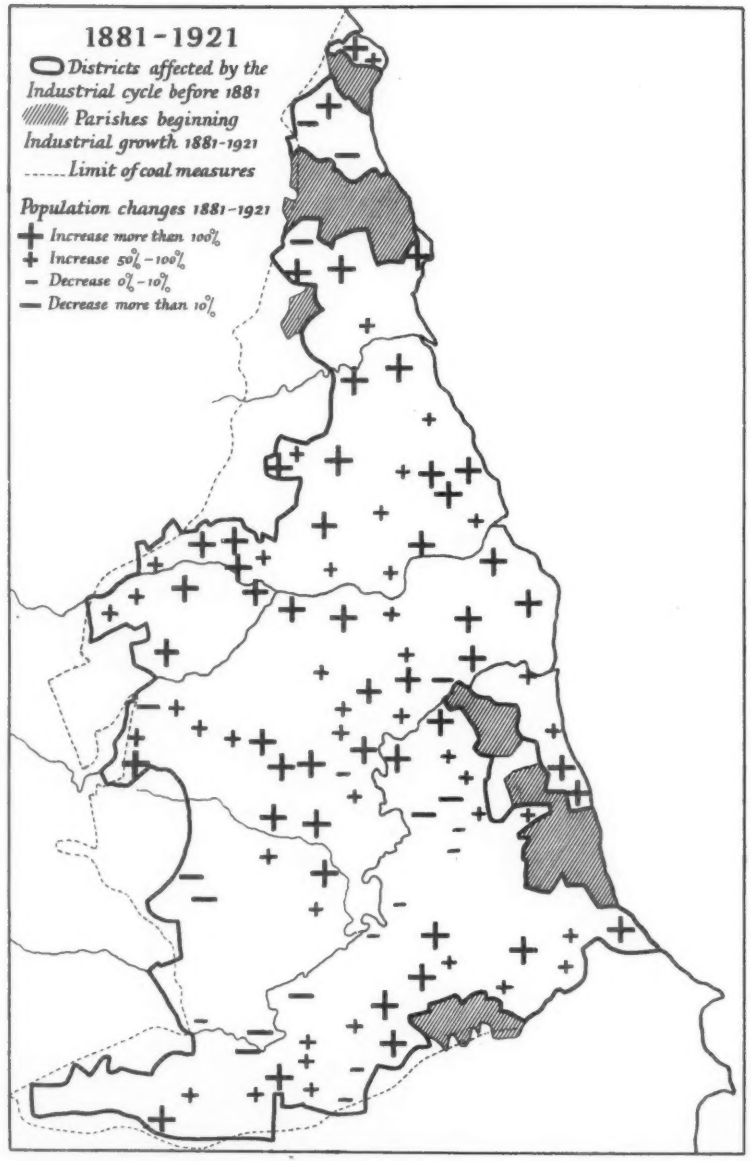
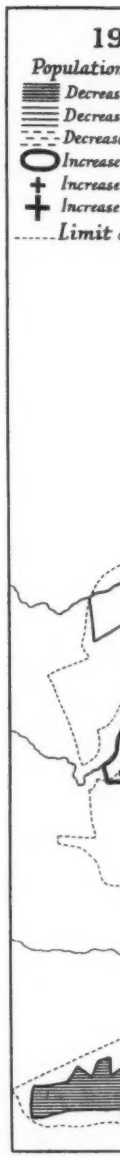
POPULATION CHANGES IN THE COLLIERY DISTRICTS
Smailes

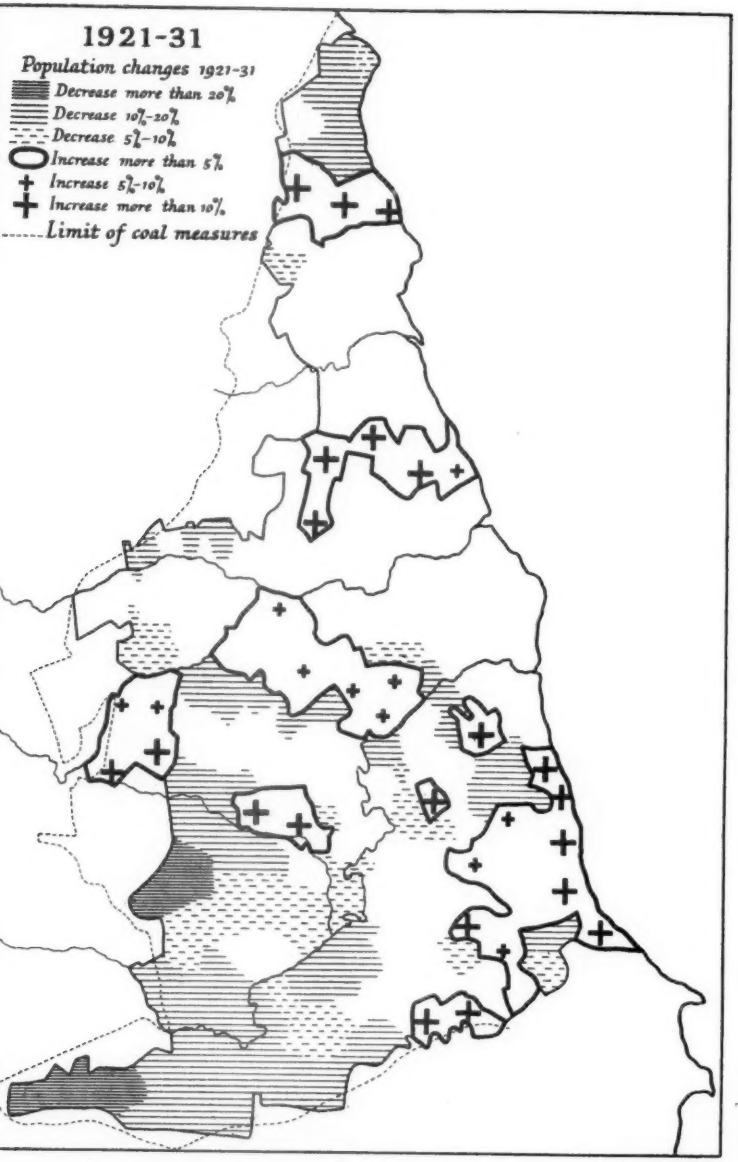

1851-81
Districts affected by the Industrial cycle before 1851
Parishes beginning Industrial growth 1851-1881
Limits of coal measures
Population changes 1851-81
Increase more than 100%
Increase 50%-100%
Decrease 0%-10%
Decrease more than 10%

5

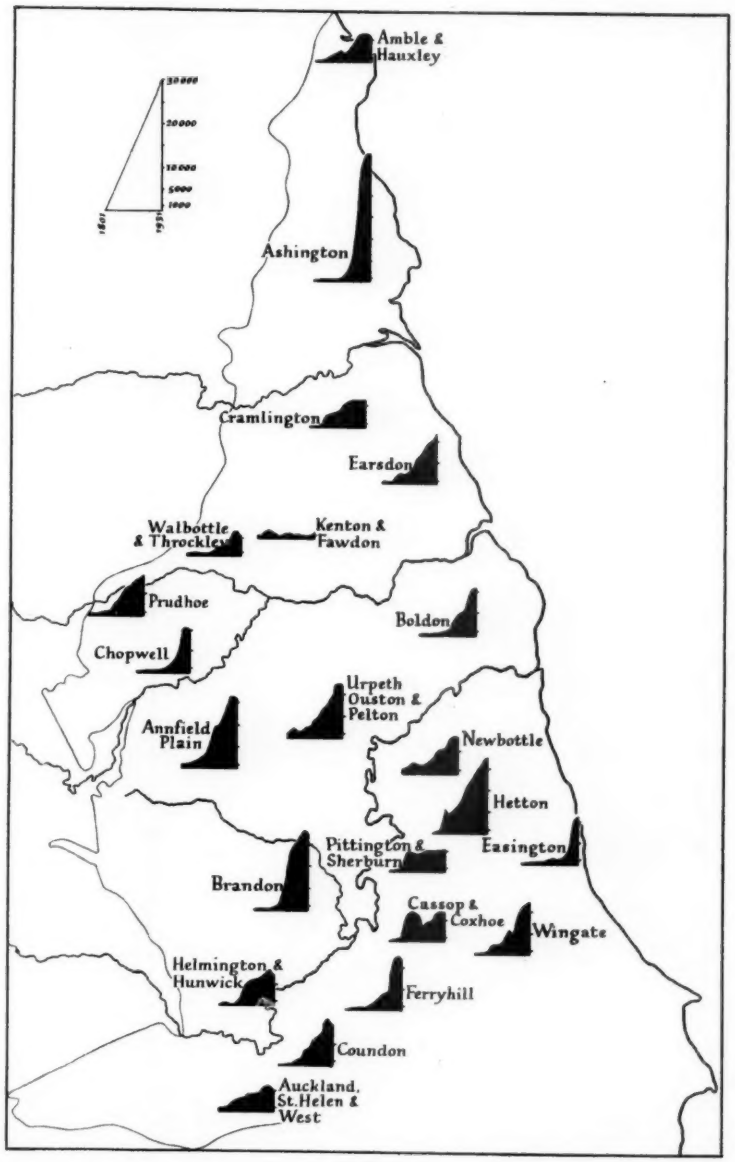

1881-1921
Districts affected by the Industrial cycle before 1881
Parishes beginning Industrial growth 1881-1921
Limit of coal measures
Population changes 1881-1921
Increase more than 100%
Increase 50%-100%
Decrease 0%-10%
Decrease more than 10%

7


19
Population
Increase
Limit


1921-31
Population changes 1921-31
Decrease more than 20%
Decrease 10%-20%
Decrease 5%-10%
Increase more than 5%
Increase 5%-10%
Increase more than 10%
Limit of coal measures

8


Amble & Hauxley
Ashington
Cramlington
Earsdon
Walbottle & Throckley
Kenton & Fawdon
Prudhoe
Boldon
Chopwell
Urpeth Ouston & Pelton
Annfield Plain
Newbottle
Hetton
Easington
Pittington & Sherburn
Brandon
Cassop & Coxhoe
Wingate
Helmington & Hunwick
Ferryhill
Coundon
Auckland, St. Helen & West

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